An annotated checklist of bryophytes of Europe, Macaronesia and Cyprus

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ABSTRACT

Introduction. Following on from work on the European bryophyte Red List, the taxonomically and nomenclaturally updated spreadsheets used for that project have been expanded into a new checklist for the bryophytes of Europe. This includes hornworts, liverworts and mosses.

Methods. A steering group of ten European bryologists was convened, and over the course of a year, the spreadsheets were compared with previous European checklists, and all changes noted. Recent literature was searched extensively. A taxonomic system was agreed, and the advice and expertise of many European bryologists sought.

Key Results. A new European checklist of bryophytes, comprising hornworts, liverworts and mosses, is presented. Fifteen new combinations are proposed.

Conclusions. This checklist provides a snapshot of the current European bryophyte flora in 2019. It will already be out-of-date on publication, and further research, particularly molecular work, can be expected to result in many more changes over the next few years.

Keywords. Bryophytes, mosses, liverworts, hornworts, Europe, checklist

Introduction

The last published annotated checklist for mosses in Europe was Hill et al. (2006), while for liverworts and hornworts it was Grolle and Long (2000), although a checklist with distributional records was produced by Söderström et al. (2002) and updated by Söderström et al. (2007). In addition, Séneca and Söderström (2009) published a checklist of the Sphagnophyta of Europe and Macaronesia with distribution data. During work for the new European bryophyte Red List, it became apparent that not only was it necessary to publish a new European checklist covering all the bryophytes, but also that this would be relatively little extra work, because spreadsheets of species indicating their distribution by country had been prepared for the Red List, and every effort made to update the nomenclature and taxonomy. A new checklist is also needed because of the great amount of new molecular work that has been done (and continues to be done) on bryophytes, revealing many new and often unexpected relationships. The nomenclature of liverworts and hornworts in particular has undergone radical changes, as recorded in the recent World Checklist (Söderström *et al.* 2016), which, however, did not contain synonyms.

Ironically, Hill et al. (2006) was prepared in response to the intention of the European Committee for the Conservation of Bryophytes (ECCB) to produce a new Red List, but the latter had to wait another ten years before being addressed properly, when the ECCB entered into collaboration with the International Union for the Conservation of Nature (IUCN), at which point LIFE funding became available for the Red List project. The Red List has now been published (Hodgetts et al. 2019), and the names are substantially the same as in this checklist, although there have been some updates and additions to the checklist since the Red List cut-off date of 31 December 2018, and the geographical areas covered by the Red List and the checklist differ slightly (see below).

Methods

Following work on the Red List, funding was secured from the Irish government's National Parks and Wildlife Service to enable author NGH to co-ordinate a new checklist project. A Steering Group was set up consisting of Tom Blockeel, Steffen Caspari, Nick Hodgetts, Misha Ignatov, Nadya Konstantinova, Neil Lockhart, Beata Papp, Christian Schröck, Manuela Sim-Sim and Lars Söderström. Communication has largely been through e-mail, but the Steering Group met once in Budapest, in November 2018, to coincide with the final Red List meeting. After this meeting, NGH led on the moss part of the checklist and author LS led on the liverworts and hornworts.

The existing network of ECCB contacts was crucial to the project, and a large number of bryologists in Europe have contributed, with those making major contributions included in the authorship.

The first step was to compare the Red List spreadsheets, which had been kept up-to-date taxonomically and nomenclaturally, with Hill et al. (2006) and Grolle and Long (2000). Differences between these checklists and current concepts were highlighted and marked for comment. These spreadsheets were then examined closely, species by

species, at the Steering Group meeting, with two sub-groups convened, one for mosses, the other for liverworts and hornworts. A team of experts on particular taxonomic groups of mosses was recruited to advise on their areas of expertise. These are listed below and are included in the authorship of this paper:

Neil Bell, Isuru Kariyawasam – Polytrichaceae
Hans Blom – *Schistidium*
Ida Bruggeman-Nannenga – Fissidentaceae
Monserrat Brugués – Funariaceae
Johannes Enroth – Neckeraceae
Kjell Ivar Flatberg – Sphagnaceae
Lars Hedenäs – Amblystegiaceae, Calliergonaceae, pleurocarps
David Holyoak – Bryaceae
Jan Kučera – Pottiaceae
Paco Lara, Ricardo Garilleti – Orthotrichaceae
Ron Porley – *Grimmia* and *Coscinodon*

Specialist advice was either not needed or not available for other groups. It was less crucial to have specialist advice on taxonomic groups of liverworts, as much of the work had been done previously for the World Checklist (Söderström et al. 2016). The provisional spreadsheets were also sent to other bryologists for further expert advice (authors DB, VH and HK and those listed in acknowledgements below).

Taxonomic hierarchy

For the liverworts and hornworts, the taxonomic hierarchy follows the Catalogue of Life (Roskov et al. 2019), the online database of the world's known species of animals, plants, fungi and micro-organisms, in which the hierarchy for the hornworts (Anthocerotophyta) and the liverworts (Marchantiophyta) is contributed by the Early Land Plants Today project (Söderström et al. 2019). The higher classification is substantially the same as the one presented in the bryophyte phylogeny poster by Cole et al. (2019).

It was more complicated to agree on a higher classification of mosses, as current concepts are in a considerable state of flux as more molecular work is done. Pleurocarpous mosses in particular have undergone many changes in recent years, and it is expected that this will continue before relative stability is achieved. Our starting point was Frey and Stech (2009), but it has been necessary to update this treatment with the results of new research. The resultant higher classification is substantially in agreement with the poster produced recently by Cole et al. (2019), which is probably the most accurate representation of the higher classification of mosses as it is currently understood, although there are some differences. For example, Cole et al. (2019) place *Hypopterygium* in the order Hypopterygiales, while we have it in the Hypopterygiaceae within the order Hookeriales.

The final higher classification presented in this checklist is not offered as a definitive view, and it can be expected that there will be further changes with more research.

List of taxa

As Hill et al. (2006) and Grolle and Long (2000) were the starting points for this checklist, taxa that have remained the same since these publications are mostly listed without further comment. All synonyms that have been used since these publications are included. In addition, some synonyms whose synonymy predates these publications, but have continued to be in common usage, have been included. The liverworts in particular have undergone some radical taxonomic and nomenclatural changes since Grolle and Long (2000). Most of these are recorded, but without synonyms, in the World Checklist (Söderström et al. 2016). The synonymy for the liverworts is therefore considerably more extensive than that for the mosses.

Hybrid taxa are mentioned only if they have been treated in recent literature.

Author citations

We have tried to follow the International Plant Names Index (www.ipni.org) for author citations, although no doubt we will not always have succeeded. In practice, most author citations, except for very recently treated taxa, are the same as in Hill et al. (2006) for the mosses and Söderström et al. (2016) for the liverworts and hornworts, but a small number of citations have been corrected.

***Bryum* s.lat.**

It is necessary to make some remarks about *Bryum* s.l., as the current position is confusing and unsatisfactory. The reviews of world-wide scope by Ochi (1959, 1970, 1972, 1980, 1981, etc.) placed all European Bryaceae in genus *Bryum* with several subgenera, on the basis of extensive morphological studies. Other workers treated his subgenera as genera, *Anomobryum*, *Brachymenium*, *Bryum*, *Plagiobryum*, *Rhodobryum* (e.g. Holyoak in Hill et al. 2006, Guerra et al. 2010a). Molecular data (Pedersen and Hedenäs 2002, 2003, Pedersen, Cox and Hedenäs 2003, Pedersen, Holyoak and Newton 2007) showed this generic treatment to be ill-founded, since several of the widely recognised subgenera/genera were shown to be polyphyletic. It also became apparent that morphology in Bryaceae often provides entirely misleading evidence of phylogeny: Examples of this include the morphologically striking'*Plagiobryum*' *zieri* nested within a clade containing e.g. *Ptychostomum pseudotriquetrum*, the superficially similar small tuber-bearing '*Erythrocarpa*' belonging in at least two distinct genera, and some *Bryum dichotomum* being difficult to separate morphologically from *Ptychostomum imbricatulum* (syn. *Bryum caespiticium*). Thus, morphological evolution in Bryaceae appears to be'decoupled' from phylogeny (Holyoak and Pedersen 2007). Generic allocations based on morphology alone are therefore prone to error, some through convergent evolution of distant relatives, others by rapid change among close relatives. These findings have not been refuted by subsequent studies and parts of the sequence data used have been confirmed and supplemented by other workers (Guerra et al. 2008, 2011, Wang and Zhao 2009, Bell, Long and Hollingsworth 2013). Thus the generic taxonomy adopted here is based mainly on molecular data.

Nevertheless, Spence (2014) and e.g. Ochyra et al. (2018) have largely ignored the implications of the molecular results and used morphology almost exclusively for their generic classifications. Parts of the classifications by Spence are directly contradicted by molecular data (cf. Shaw 2014: 10-11); much of the remainder is at risk of being erroneous due to convergent evolution.

It is frustrating that a lack of further molecular data still prevents the allocation of some species to segregate genera, but this problem is declining as more species are sequenced. Indeed, some unpublished DNA barcoding and nuclear genomic sequencing data from one of the authors (DB), along with some last-minute sequencing by another (MSI), and interpretation by a third (DTH), have resulted in a clarification of generic affinity for several species. Further sequencing work should see significant increases in the data available within the next few years. The alternative of reverting to an enormous and still partly polyphyletic genus *Bryum* thus seems to be a poorer option. It would also be out of step with the rapidly improving classifications of some other moss families. Currently recognised European genera of Bryaceae in this checklist are *Anomobryum*, *Brachymenium*, *Bryum*, *Imbribryum*, *Ptychostomum* and *Rhodobryum*. We do not recognise *Gemmabryum*, *Osculatia*, *Plagiobryoides*, *Plagiobryum* or *Rosulabryum*.

Area covered

For the purposes of this checklist, Europe is regarded in the same way as it was in Hill et al. (2006), with the addition of Cyprus. Thus, the following territories at the margins of Europe are included:

All of Russia west of the Ural watershed and to the north of the Caucasus watershed;
Western Kazakhstan;
Iceland;
Svalbard;
Jan Mayen;
Novaya Zemlya;
Franz Josef Land;
Malta;
all the Greek Islands;
all other Mediterranean islands belonging to European countries (e.g. Pantelleria);
Turkey west of the Bosporus (i.e. Turkey-in-Europe);
Azores;
Canary Islands;
Madeira.

The decision to include Cyprus was made because it is politically part of Europe, although geographically closer to Asia. In practice, its inclusion or exclusion is fairly academic, as there are no bryophyte taxa known that have their only ‘European’ occurrence in Cyprus, except for the dubious species *Funaria anomala*, and possibly *Grimmia ungeri*, which has been considered to be endemic to Cyprus by some authors.

The area covered differs slightly from that covered by the Red List (IUCN 2019), which excludes the Caucasus. Both the checklist and the Red List exclude Cape Verde (Cabo Verde).

Composition of the bryophyte flora

The moss flora of Europe, as understood in this checklist, comprises 1390 species, plus 45 subspecies and 104 varieties. There are 501 species of liverworts, with 35 subspecies and 55 varieties, and 8 species of hornworts, with no subspecies or varieties, giving a total of 1899 species of bryophytes in Europe, plus 80 subspecies and 159 varieties. These figures only include subspecies and varieties where species

are represented by more than one subspecies or variety in Europe. There are 187 endemic taxa, with 56 of these being endemic to the Macaronesian islands. The level at which a taxon is recognised is always to some extent arbitrary, even with the benefit of molecular data. In general, we have included subspecies and varieties if they have been validly published and there is no good reason to reject them. However, this self-imposed guidance has been considerably modified according to expert opinion from many of the authors and those listed in the acknowledgements. It is indicated in the footnotes where disagreement exists.

There are 23 obvious introductions that are now more or less naturalised in at least some part of Europe. These are listed in Table 1. Taxa are considered introductions only if they have clearly been introduced by human agency. Other species that might be regarded as introductions, that may for example be chance ephemeral colonists from wind-blown spores, are regarded as native, as they apparently arrived through natural agency. Whether any particular taxon is native or not to Europe is of course arguable. To some extent the native status of taxa matters less for bryophytes than it does for vascular plants, since their often very efficient dispersal mechanisms mean that many species can potentially occur in suitable habitats worldwide. Several further species were listed by Hill et al. (2006) as non-native (*Anomobryum apiculatum*, *Bryum valparaisense*, *Chenia leptophylla*, *Splachnobryum obtusum*, *Syntrichia bogotensis*, *Tortula bogosica*, *Tortula bolanderi*), but there is significant doubt about their non-native status, and they are not listed in Table 1.

Table 1. Bryophytes introduced to Europe

Species	Location	Native range
Liverworts		
Heteroscyphus fissistipus	garden in Ireland	Australia, New Zealand
Lophocolea bispinosa	gardens and naturalised in Britain, Ireland & Spain	Australia
Lophocolea brookwoodiana	cemetery in southern England	Unknown
Lophocolea semiteres	naturalised in western Europe	Southern Hemisphere
Sphaerocarpos stipitatus	Portugal	Southern Hemisphere
Tricholepidozia lindenbergii* var. *lindenbergii	gardens in Wales	New Zealand, Philippines and Fiji
Tricholepidozia tetradactyla	gardens in Britain	New Zealand
Mosses		
Achrophyllum dentatum	garden in England	Southern Hemisphere
Atrichum crispum	naturalised in Britain & Ireland	Eastern North America
Calomnion complanatum	gardens in Ireland	Australia, New Zealand
Calyptrochaeta apiculata	naturalised in southern England & Ireland	Southern Hemisphere
Campylopus introflexus	naturalised & widespread	Southern Hemisphere

	in much of Europe	
Dicranoloma menziesii	on tree ferns in garden in Ireland	Southern Hemisphere
Hennediella macrophylla	naturalised in Britain	New Zealand
Hennediella stanfordensis	naturalised in Britain, Ireland, France & Greece	California, Mexico & Australia
Hypopterygium tamarisci	gardens in Portugal & Italy	Tropical Africa & America
Leptodontium proliferum	bowling green in northern England	Southern Hemisphere
Leptotheca gaudichaudii	gardens in southern England & Ireland	Southern Hemisphere
Myuroclada maximowiczii	garden in southern Russia	Eastern Asia, Alaska
Orthodontium lineare	naturalised & widespread in western and central Europe	Southern Hemisphere
Sematophyllum adnatum	naturalised in northern Italy, Switzerland & Hungary	America
Thuidiopsis sparsa	former park in Madeira	Southern Hemisphere
Tortula amplexa	naturalised in England	Western North America

New validations
Three liverwort taxa were published invalidly and therefore require validation.

Riccia sorocarpa subsp. ***arctica*** R.M.Schust. ex Köckinger & L.Söderstr., ***subsp. nov.*** [=*Riccia sorocarpa* var. *arctica* R.M.Schust., *J. Hattori Bot. Lab*. 71: 274, 1992, *nom. inval.* ICN Art. 37.7]. Holotype: Greenland, Kangerdlugssuak, Inglefield Bay, NW. Greenland, *R.M.Schuster 45831* (F-C0000489F; http://emuweb.fieldmuseum.org/botany/Display.php?irn=9894&QueryPage=%2Fbotany%2Fdetailed.php). The description in Schuster (1992a) together with the current data on type specimen validates the name. This subspecies was described from Greenland but also occurs in the Alps (Köckinger 2017).

Riccia sorocarpa subsp. ***erythrophora*** R.M.Schust. ex Konstant. & L.Söderstr., ***subsp. nov.*** [*Riccia sorocarpa* subsp. *erythrophora* R.M.Schust., *J. Hattori Bot. Lab*. 71: 274, 1992, *nom. inval.* ICBN Art. 37.7]. Holotype: California: 1.5 km W of Potrero, San Diego Co., 1982, *R.M.Schuster 82-146* (F-C1049209F; http://emuweb.fieldmuseum.org/botany/Display.php?irn=2346544&QueryPage=%2Fbotany%2Fdetailed.php; type originally filed under *Riccia nigrella*). The description in Schuster (1992a) together with the current data on the type specimen validate the name. It was described from California but is also known from southern Russia (Konstantinova and Doroshina 2011).

Scapania paludicola var. ***rotundiloba*** R.M.Schust. ex Konstant. & L.Söderstr., ***var. nov***. Holotype: "West Greenland: east end of Nûk Peninsula, Alángup nunâ, 68°42'N., 52°10'W. *Schuster & Damsholt RMS 70-2878"* (F-C0171445F; http://emuweb.fieldmuseum.org/botany/Display.php?irn=2145467&QueryPage=%2Fbotany%2Fdetailed.php) = *Scapania paludosa* var. *rotundiloba* R.M.Schust., *Hepat.*

Anthocerotae N. Amer. 3: 519, 1974, *nom. inval.* (ICBN Art. 37.2; based on more than one gathering). The description in Schuster (1974: 519), together with the type selected here, validates the name.

New combinations
New combinations are made by individual authors.

Mesoptychia gillmanii var. ***laxa*** (Schiffn. ex Burrell) L.Söderstr. ***comb. nov***. Basionym: *Lophozia schultzii* var. *laxa* Schiffn. ex Burrell, J. Bot. 49: 217, 1911 (see Burrell 1911).

Anomobryum apiculatum (Schwägr.) D.Bell & Holyoak ***comb. nov.*** Basionym: Bryum apiculatum Schwägr., Sp. Musc. Frond., Suppl. 1, sect. 2, p. 102, pl. 72 [top], 1816 (see Schwägrichen 1816).

Anomobryum notarisii (Mitt.) D.Bell & Holyoak ***comb. nov.*** Basionym: *Bryum notarisii* Mitt., J. Linn. Soc., Bot., 7, p. 3, 1864 (see Mitten 1864).

Didymodon glaucus subsp. ***verbanus*** (W.E.Nicholson & Dixon) Jan Kučera ***comb. nov.*** Basionym: *Eucladium verbanum* W.E.Nicholson & Dixon, *Revue Bryologique* 39: 89. 1912 (see Dixon 1912).

Fissidens subgenus ***Pachyfissidens*** (Müll.Hal.) L.Söderstr. & A.Hagborg, ***comb. nov.*** Basionym: *Fissidens* sect. *Pachyfissidens* Müll.Hal., Syn. Musc. Frond. 1: 45, 1849 [1848] (see Müller 1849). Note: The subgenus has frequently been cited from Kindberg (1897), but in that paper *Pachyfissidens* is an unranked taxon. We have not been able to localise any valid combination at subgeneric rank and thus propose it here.

Imbribryum subapiculatum (Hampe) D.Bell & Holyoak ***comb. nov.*** Basionym: *Bryum subapiculatum* Hampe, Vidensk. Meddel. Dansk Naturhist. Foren. Kjøbenhavn, ser. 3, 4, p. 51, 1872 (see Hampe 1872).

Imbribryum tenuisetum (Limpr.) D.Bell & Holyoak ***comb. nov*.** Basionym: *Bryum tenuisetum* Limpr., Jahresber. Schles. Ges. Vaterl. Cult., 74(2b), p. 4, 1897 (see Limpricht 1897).

Mnioideae L.Söderstr., N.G.Hodgetts & Ignatov, ***comb. et stat. nov.***
Basionym: Trib. Mnieae Müll., Syn. Musc. Frond.: 152, 1858 (Müller 1858) 'Mnioideae'.
≡ Mnioideae A.J.E.Sm., Moss Flora Brit. Ireland, 2nd ed.: 615, 2004 (Smith 2004), nom. inval. (ICN Art. 39.1; no Latin description).
≡ Mnioideae Stech & W.Frey, Syll. Pl. Fam. 3: 196 (Frey & Stech 2009), nom. inval. (ICN Art. 39.1; no Latin description).
≡ Mnioideae T.J.Kop., Acta Bryolich. Asiatica 5: 39 (Koponen 2014), nom. inval. (ICN Art. 38.1(a); no description).
Type genus: *Mnium* Hedw. Note: The subfamily Mnioideae has been recognized for a long time but as far as we know never been validated. Most authors seem to assume it is an autonym under Mniaceae (e.g. Smith 1978, Frye & Stech 2009). However, autonyms only exist under genera and species (ICN Art. 22.1 and 26.1; Turland et al. 2018) so a formal description of the taxon is needed. No description before 2011 is in Latin, as required then, or refers to Müller (1858) to make it a valid combination. Latin

descriptions have been unnecessary since 2011, but we have not found any recent description of any sort that fulfils all the criteria. Frey & Stech (2009) give a good description, but they seem to treat all subfamilies based on the family name as autonyms, contrary to the code (Turland et al. 2018). A reference to Müller (1858), who treats the taxon as a tribus (although with an incorrect ending according to the current code), validates the name.

Platyhypnum tatrense (Váňa) Hedenäs & Ignatov ***comb. nov*****.** Basionym: *Ochyraea tatrensis* Váňa, J. Bryol. 14: 261. f. 1-3. 1986 (see Váňa 1986).

Ptychostomum austriacum (Köckinger, Holyoak & Suanjak) D.Bell & Holyoak ***comb. nov*****.** Basionym: *Bryum austriacum* Köckinger, Holyoak & Suanjak, J. Bryol. 35(1), p. 57, 2013 (see Köckinger et al. 2013).

Ptychostomum cellulare (Hook. in Schwägr.) D.Bell & Holyoak ***comb. nov.*** Basionym: Bryum cellulare Hook. in Schwägr., Sp. Musc. Frond., Suppl. 3, vol. 1, sect. 1, p. 9, pl. 214a, fig. a, 1827 (see Schwägrichen 1827).

Ptychostomum elegans (Nees in Brid.) D.Bell & Holyoak ***comb. nov*****.** Basionym: *Bryum elegans* Nees, Bryol. Univ. 1 (2): p. 849. 1827 (see Bridel 1827).

Ptychostomum minii (Podp. ex Guim.) D.Bell & Holyoak ***comb. nov.*** Basionym: Bryum minii Podp. ex Guim., Rev. Bryol. Lichénol., 8, pp. 112-114, 1935.

Ptychostomum schleicheri (DC. in Lam.) J.R.Spence ex D.Bell & Holyoak ***comb. nov***. Basionym: *Bryum schleicheri* DC. in Lam., Fl. Franç., 6, p. 226, 1815 (see Lamarck 1815).

Ptychostomum schleicheri* var. *latifolium (Schwägr.) D.Bell & Holyoak ***comb. nov***. Basionym: *Mnium latifolium* Schwägr., Spec. Musc. Suppl. 1(2), p. 138, 1816 ≡ *Bryum schleicheri* Schwägr. var. *latifolium* (Schwägr.) Kindb.

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Taxonomic synopsis

This synopsis lists the higher taxa relevant to Europe down to family level.

Anthocerotophyta
- Anthocerotopsida de Bary ex Jancz.
  - Anthocerotidae Rosenv.
    - Anthocerotales Limpr.
      - Anthocerotaceae Dumort.
  - Dendrocerotideae R.J.Duff
    - Phymatocerotales R.J.Duff
      - Phymatocerotaceae R.J.Duff
  - Notothylatidae R.J.Duff
    - Notothyladales Hyvönen & Piippo
      - Notothyladaceae Müll.Frib. ex Prosk.
  - Phaeocerotideae Hässel

Marchantiophyta
- Haplomitriopsida Stotler & Crand.-Stotl.
  - Haplomitriidae Stotler & Crand.-Stotl.
    - Calobryales Hamlin
      - Haplomitriaceae Dědeček
- Jungermanniopsida Stotler & Crand.-Stotl.
  - Jungermanniidae Engl.
    - Jungermanniales H.Klinggr.
      - Cephaloziineae Schljakov.
        - Adelanthaceae Grolle
        - Anastrophyllaceae L.Söderstr., De Roo & Hedd.
        - Cephaloziaceae Mig.
        - Cephaloziellaceae Douin
        - Lophoziaceae Cavers
        - Scapaniaceae Mig.
      - Jungermanniineae R.M.Schust. ex Stotler & Crand.-Stotl.
        - Acrobolbaceae E.A.Hodgs.
        - Antheliaceae R.M.Schust.
        - Arnelliaceae Nakai
        - Calypogeiaceae Arnell
        - Endogemmataceae Konstant.
        - Geocalycaceae H.Klinggr.
        - Gymnomitriaceae H.Klinggr.
        - Harpanthaceae Arnell
        - Hygrobiellaceae Konstant. & Vilnet

- Jungermanniaceae Rchb.
- Saccogynaceae Heeg
- Solenostomataceae Stotler & Crand.-Stotl.
- Southbyaceae Váňa, Crand.-Stotl., Stotler & D.G.Long
- Lophocoleineae Schljakov
  - Blepharostomataceae W.Frey & M.Stech
  - Herbertaceae Müll.Frib. ex Fulford & Hatcher
  - Lepidoziaceae Limpr.
  - Lophocoleaceae Vanden Berghen
  - Mastigophoraceae R.M.Schust.
  - Plagiochilaceae Müll.Frib.
  - Trichocoleaceae Nakai
- Myliineae J.J.Engel & Braggins ex Crand.-Stotl.
  - Myliaceae Schljakov
- Porellales Schljakov
  - Jubulineae Müll.Frib.
    - Frullaniaceae Lorch
    - Jubulaceae H.Klinggr.
    - Lejeuneaceae Cavers
  - Porellineae R.M.Schust.
    - Porellaceae Cavers
  - Radulineae R.M.Schust.
    - Radulaceae Müll.Frib.
- Ptilidiales Schljakov
  - Ptilidiaceae H.Klinggr.
- Metzgeriidae Barthol.-Began
  - Metzgeriales Chalaud
    - Aneuraceae H.Klinggr.
    - Metzgeriaceae H.Klinggr.
  - Pleuroziales Schljakov
    - Pleuroziaceae Müll.Frib.
- Pelliidae He-Nygrén
  - Fossombroniales Schljakov
    - Calyculariineae He-Nygrén, Juslén, Ahonen, Glenny & Piippo
      - Calycullariaceae He-Nygrén, Juslén, Ahonen, Glenny & Piippo
    - Fossombroniineae R.M.Schust. ex Stotler & Crand.-Stotl.
      - Fossombroniaceae Hazsl.
      - Petalophyllaceae Stotler & Crand.-Stotl.
  - Pallaviciniales W.Frey & M.Stech
    - Pallaviciniineae R.M.Schust.
      - Moerckiaceae K.I.Goebel ex Stotler & Crand.-Stotl.
      - Pallaviciniaceae Mig.
  - Pelliales He-Nygrén
    - Pelliaceae H.Klinggr.
- Marchantiopsida Cronquist
  - Blasiidae He-Nygrén
    - Blasiales Stotler & Crand.-Stotl.
      - Blasiaceae H.Klinggr.
  - Marchantiidae Engl.
    - Lunulariales H.Klinggr.

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- Lunulariaceae H.Klinggr.
- Marchantiales Limpr.
  - Aytoniaceae Cavers
  - Cleveaceae Cavers
  - Conocephalaceae Müll.Frib. ex Grolle
  - Corsiniaceae Engl.
  - Cyathodiaceae Stotler & Crand.-Stotl.
  - Dumortieraceae D.G.Long
  - Exormothecaceae Müll.Frib. ex Grolle
  - Marchantiaceae Lindl.
  - Oxymitraceae Müll.Frib. ex Grolle
  - Ricciaceae Rchb.
  - Targioniaceae Dumort.
- Sphaerocarpales Cavers
  - Riellaceae Engl.
  - Sphaerocarpaceae Heeg.

Bryophyta
Sphagnophytina Doweld
- Sphagnopsida Schimp.
  - Sphagnales Limpr.
    - Sphagnaceae Dumort.

Bryophytina Engler
- Andreaeopsida J.H.Schaffn.
  - Andreaeidae Engl.
    - Andreaeales Limpr.
      - Andreaeaceae Dumort.
- Oedipodiopsida Goffinet & W.R.Buck
  - Oedipodiales Goffinet & W.R.Buck
    - Oedipodiaceae Schimp.
- Tetraphidopsida Goffinet & W.R.Buck
  - Tetraphidales M.Fleisch.
    - Tetraphidaceae Schimp.
- Polytrichopsida Doweld
  - Polytrichales M.Fleisch.
    - Polytrichaceae Schwägr.
- Bryopsida Pax
  - Buxbaumiidae Doweld
    - Buxbaumiales M.Fleisch.
      - Buxbaumiaceae Schimp.
  - Diphysciidae Ochyra
    - Diphysciales M.Fleisch.
      - Diphysciaceae M.Fleisch.
  - Timmiidae Ochyra
    - Timmiales Ochyra
      - Timmiaceae Schimp.
  - Encalyptidae Ochyra, Żarnowiec & Bedn.-Ochyra
    - Encalyptales Dixon
      - Encalyptaceae Schimp.
  - Funariidae Ochyra
    - Funariales M.Fleisch.

- Funariaceae Schwägr.
- Disceliaceae Schimp.

Gigaspermidae M.Stech & W.Frey
- Gigaspermales Goffinet, Wickett, O.Werner, Ros, A.J.Shaw & C.J.Cox
  - Gigaspermaceae Lindb.

Dicranidae Doweld
- Catoscopiales Ignatov & Ignatova
  - Catoscopiaceae Broth.
- Dicranales H.Philib ex M.Fleisch.
  - Timmiellaceae Y.Inoue & H.Tsubota
  - Distichiaceae Schimp.
  - Hymenolomataceae Ignatov & Fedosov
  - Flexitrichaceae Ignatov & Fedosov
  - Bryoxiphiaceae Besch.
  - Archidiaceae Schimp.
  - Micromitriaceae Smyth ex Goffinet & Budke
  - Leucobryaceae Schimp.
  - Amphidiaceae M.Stech
  - Aongstroemiaceae De Not.
  - Dicranellaceae M.Stech
  - Fissidentaceae Schimp.
  - Dicranaceae Schimp.
  - Calymperaceae Kindb.
  - Rhabdoweisiaceae Limpr.
  - Schistostegaceae Schimp.
  - Bruchiaceae Schimp.
  - Ditrichaceae Limpr.
  - Pottiaceae Schimp.
- Grimmiales M.Fleisch.
  - Saelaniaceae Ignatov & Fedosov
  - Seligeriaceae Schimp.
  - Ptychomitriaceae Schimp.
  - Grimmiaceae Arn.

Bryidae Engl.
- Hedwigiales Ochyra
  - Hedwigiaceae Schimp.
- Bartramiales D.Quandt, N.E.Bell & M.Stech
  - Bartramiaceae Schwägr.
- Splachnales Ochyra
  - Splachnaceae Grev. & Arn.
  - Meesiaceae Schimp.
- Bryales Limpr.
  - Bryaceae Schwägr.
  - Mniaceae Schwägr.
- Orthotrichales Dixon
  - Orthotrichaceae Arn.
- Orthodontiales N.E.Bell, A.E.Newton & D.Quandt
  - Orthodontiaceae Goffinet
- Aulacomniales N.E.Bell, A.E.Newton & D.Quandt
  - Aulacomniaceae Schimp.

Rhizogoniales Goffinet & W.R.Buck
Rhizogoniaceae Broth.
Hookeriales M.Fleisch.
Hypopterygiaceae Mitt.
Daltoniaceae Schimp.
Hookeriaceae Schimp.
Leucomiaceae Broth.
Pilotrichaceae Kindb.
Hypnales W.R.Buck & Vitt
Fontinalaceae Schimp.
Plagiotheciaceae M.Fleisch.
Fabroniaceae Schimp.
Pterigynandraceae Schimp.
Habrodontaceae Schimp.
Climaciaceae Kindb.
Myriniaceae Schimp.
Amblystegiaceae G.Roth
Calliergonaceae Vanderp., Hedenäs, C.J.Cox & A.J.Shaw.
Scorpidiaceae Ignatov & Ignatova
Leskeaceae Schimp.
Pseudoleskeaceae Schimp.
Pseudoleskeellaceae Ignatov & Ignatova
Thuidiaceae Schimp.
Brachytheciaceae Schimp.
Hypnaceae Schimp.
Callicladiaceae Jan Kučera & Ignatov
Taxiphyllaceae Ignatov
Pylaisiadelphaceae Goffinet & W.R.Buck
Jocheniaceae Jan Kučera & Ignatov
Stereodontaceae Hedenäs, Schlesak & D.Quandt
Pylaisiaceae Schimp.
Sematophyllaceae Broth.
Hylocomiaceae M.Fleisch.
Rhytidiaceae Broth.
Entodontaceae Kindb.
Cryphaeaceae Schimp.
Leucodontaceae Schimp.
Antitrichiaceae Ignatov & Ignatova
Neckeraceae Schimp.
Heterocladiellaceae Ignatov & Fedosov
Lembophyllaceae Broth.
Echinodiaceae Broth.
Myuriaceae M.Fleisch.
Anomodontaceae Kindb.

List of Taxa

Subdivisions (‘-phytina’), subclasses (‘-ideae’) and suborders (‘-ineae’), shown in the taxonomic synopsis above, are not listed in the main checklist, but subfamilies (‘-oideae’) are included. Tribes and subtribes are included in the Lejeuneaceae, as they are fairly useful divisions.

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Hornworts

ANTHOCEROTOPHYTA

ANTHOCEROTOPSIDA DE BARY EX JANCZ.

Anthocerotales

Anthocerotaceae Dumort.

1 ***Anthoceros*** L.
- 1 ***A. agrestis*** Paton [*Anthoceros punctatus* subsp. *agrestis* (Paton) Damsh., *Anthoceros punctatus* var. *douinii* (R.M.Schust.) Damsh.]
- 2 ***A. caucasicus*** Steph.
- 3 ***A. neesii*** Prosk.
- 4 ***A. punctatus*** L.

Phymatocerotales R.J.Duff

Phymatocerotaceae R.J.Duff

2 ***Phymatoceros*** Stotler
- 1 ***P. bulbiculosus*** (Brot.) Stotler, W.T.Doyle & Crand.-Stotl. [*Phaeoceros bulbiculosus* (Brot.) Prosk.]

Notothyladales Hyvönen & Piippo

Notothyladaceae Müll.Frib. ex Prosk.
Notothyloideae Grolle

3 ***Notothylas*** Sull. ex A.Gray
subgenus *Notothylas*
- 1 ***N. orbicularis*** (Schwein.) Sull.

Phaeocerotideae Hässel

4 ***Phaeoceros*** Prosk.
- 1 ***P. carolinianus*** (Michx.) Prosk. [*Phaeoceros laevis* subsp. *carolinianus* (Michx.) Prosk.]
- 2 ***P. laevis*** (L.) Prosk.

Liverworts

MARCHANTIOPHYTA

HAPLOMITRIOPSIDA STOTLER & CRAND.-STOTL.

Calobryales Hamlin

Haplomitriaceae Dědeček

1 ***Haplomitrium*** Nees
subgenus *Haplomitrium*
section *Haplomitrium*

1 ***H. hookeri*** (Lyell ex Sm.) Nees
a var. ***hookeri*** [1]

JUNGERMANNIOPSIDA STOTLER & CRAND.-STOTL.

Jungermanniales H.Klinggr.

Adelanthaceae Grolle
Adelanthoideae K.Feldberg

2 ***Adelanthus*** Mitt.
section *Lindenbergiani* Grolle
1 ***A. lindenbergianus*** (Lehm.) Mitt.

3 ***Pseudomarsupidium*** Herzog
1 ***P. decipiens*** (Hook.) Grolle [*Adelanthus decipiens* (Hook.) Mitt.]

Jamesonielloideae Inoue

4 ***Syzygiella*** Spruce [*Jamesoniella* (Spruce) F.Lees, *Crossogyna* (R.M.Schust.) Schljakov]
subgenus *Syzygiella*
1 ***S. autumnalis*** (DC.) K.Feldberg, Váňa, Hentschel & Heinrichs [*Jamesoniella autumnalis* (DC.) Steph., *Crossogyna autumnalis* (DC.) Schljakov]
2 ***S. rubricaulis*** (Nees) Steph. [*Jamesoniella rubricaulis* (Nees) Grolle]

Anastrophyllaceae L.Söderstr., De Roo & Hedd.

5 ***Anastrepta*** (Lindb.) Schiffn.
1 ***A. orcadensis*** (Hook.) Schiffn.

6 ***Anastrophyllum*** (Spruce) Steph.
1 ***A. alpinum*** Steph. [2]
2 ***A. assimile*** (Mitt.) Steph. [*Anastrophyllum assimile* var. *nardioides* (Lindb.) Damsh.]
3 ***A. donnianum*** (Hook.) Steph.
4 ***A. joergensenii*** Schiffn.
5 ***A. michauxii*** (F.Weber) H.Buch

7 ***Barbilophozia*** Loeske
subgenus *Barbilophozia*
1 ***B. barbata*** (Schmidel ex Schreb.) Loeske [*Lophozia barbata* (Schmidel ex Schreb.) Dumort.]
2 ***B. hatcheri*** (A.Evans) Loeske [*Lophozia hatcheri* (A.Evans) Steph.]
3 ***B. lycopodioides*** (Wallr.) Loeske [*Lophozia lycopodioides* (Wallr.) Cogn.]
4 ***B. rubescens*** (R.M.Schust. & Damsh.) Kartt. & L.Söderstr. [*Lophozia rubescens* R.M.Schust. & Damsh.]
subgenus *Sudeticae* (Schljakov) L.Söderstr., De Roo & Hedd. [*Pseudolophozia* Konstant. & Vilnet]
5 ***B. sudetica*** (Nees ex Huebener) L.Söderstr., De Roo & Hedd. [*Lophozia alpestris* auct. non (Schleich. ex F.Weber) A.Evans, *Lophozia*

[1] *Haplomitrium hookeri* var. *minutum* (E.O.Campb.) Barthol.-Began occurs in Japan and New Zealand.
[2] *Anastrophyllum alpinum* was synonymised with *Anastrophyllum joergensenii* by Grolle (1964) but reinstated at species level by Long et al. (2006).

sudetica (Nees ex Huebener) Grolle, *Pseudolophozia sudetica* (Nees ex Huebener) Konstant. & Vilnet, *Lophozia sudetica* var. *anomala* (Schljakov) Schljakov, *Lophozia debiliformis* R.M.Schust & Damsh., *Pseudolophozia debiliformis* (R.M.Schust. & Damsh.) Konstant. & Vilnet, *Lophozia debiliformis* var. *concolor* R.M.Schust. & Damsh.] [3]

8 ***Biantheridion*** (Grolle) Konstant. & Vilnet
- 1 ***B. undulifolium*** (Nees) Konstant. & Vilnet [*Jamesoniella undulifolia* (Nees) Müll.Frib.]

9 ***Crossocalyx*** Meyl
- 1 ***C. hellerianus*** (Nees ex Lindenb.) Meyl. [*Anastrophyllum hellerianum* (Nees ex Lindenb.) R.M.Schust.]

10 ***Gymnocolea*** (Dumort.) Dumort.
- 1 ***G. borealis*** (Frisvoll & Moen) R.M.Schust.
- 2 ***G. fascinifera*** Potemkin [4]
- 3 ***G. inflata*** (Huds.) Dumort.
  - a subsp. ***acutiloba*** (Schiffn.) R.M.Schust. ex L.Söderstr. & Váňa [*Gymnocolea acutiloba* (Schiffn.) Müll.Frib.] [5]
  - b subsp. ***inflata*** [*Gymnocolea inflata* var. *heterostipa* (Carringt. ex Spruce) Müll.Frib.]

11 ***Isopaches*** H.Buch
- 1 ***I. alboviridis*** (R.M.Schust.) Schljakov [6]
- 2 ***I. bicrenatus*** (Schmidel ex Hoffm.) H.Buch [*Lophozia bicrenata* (Schmidel. ex Hoffm.) Dumort.]
- 3 ***I. decolorans*** (Limpr.) H.Buch [*Lophozia decolorans* (Limpr.) Steph.]

12 ***Neoorthocaulis*** L.Söderstr.
- 1 ***N. attenuatus*** (Mart.) L.Söderstr., De Roo & Hedd. [*Barbilophozia attenuata* (Mart.) Loeske, *Orthocaulis attenuatus* (Mart.) A.Evans, *Lophozia attenuata* Mart.) Dumort.]
- 2 ***N. binsteadii*** (Kaal.) L.Söderstr., De Roo & Hedd. [*Barbilophozia binsteadii* (Kaal.) Loeske, *Orthocaulis binsteadii* (Kaal.) H.Buch, *Lophozia binsteadii* (Kaal.) A.Evans]
- 3 ***N. floerkei*** (F.Weber & D.Mohr) L.Söderstr., De Roo & Hedd. [*Barbilophozia floerkei* (F.Weber & D.Mohr) Loeske, *Orthocaulis floerkei* (F.Weber & D.Mohr) H.Buch, *Lophozia floerkei* (F.Weber & D.Mohr) Schiffn.]

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[3] *Lophozia debiliformis* was not recognised in Söderström et al. (2016), following Söderström et al. (2010), although it is sometimes recognised in later publications. It is nested within *Barbilophozia sudetica* in the molecular studies by de Roo et al. (2007) and Vilnet et al. (2010) although neither type material nor material from the type locality was included. The 'taxon' is common in the mountains of Europe (e.g. in Scandinavia, the Alps) and elsewhere and may be a modification of harsh environments.

[4] *Gymnocolea fascinifera* is described from Yamal Peninsula and recently recorded for European Russia from Komi Republic by Potemkin (2008).

[5] The taxonomic value of *Gymnocolea inflata* subsp. *acutiloba* is unclear. A detailed study is needed to clarify whether this is an extreme form of *Gymnocolea inflata* s.str.

[6] *Isopaches alboviridis* was recently recorded from European Russia in Leningrad (Potemkin and Rozantseva 2015) and Murmansk Provinces (Borovichev 2008).

4 ***N. hyperboreus*** (R.M.Schust.) L.Söderstr., De Roo & Hedd. [*Barbilophozia hyperborea* (R.M.Schust.) Potemkin, *Orthocaulis hyperboreus* (R.M.Schust.) Konstant.]

13 ***Orthocaulis*** H.Buch
- 1 ***O. atlanticus*** (Kaal.) H.Buch [*Barbilophozia atlantica* (Kaal.) Müll.Frib., *Lophozia atlantica* (Kaal.) Müll.Frib.]
- 2 ***O. cavifolius*** H.Buch & S.W.Arnell [*Sphenolobus cavifolius* (H.Buch & S.W.Arnell) Müll.Frib., *Anastrophyllum cavifolium* (H.Buch & S.W.Arnell) Lammes, *Lophozia cavifolia* (H. Buch & S.W.Arnell) R.M.Schust.]

14 ***Schizophyllopsis*** Váňa & L.Söderstr.
- 1 ***S. sphenoloboides*** (R.M.Schust.) Váňa & L.Söderstr. [*Anastrophyllum sphenoloboides* R.M.Schust.] [7]

15 ***Schljakovia*** Konstant. & Vilnet
- 1 ***S. kunzeana*** (Huebener) Konstant. & Vilnet [*Barbilophozia kunzeana* (Huebener) Müll.Frib., *Lophozia kunzeana* (Huebener) A.Evans]

16 ***Schljakovianthus*** Konstant. & Vilnet
- 1 ***S. quadrilobus*** (Lindb.) Konstant. & Vilnet [*Barbilophozia quadriloba* (Lindb.) Loeske, *Lophozia quadriloba* (Lindb.) A.Evans, *Lophozia quadriloba* var. *glareosa* (Jørg.) Jørg.]

17 ***Sphenolobopsis*** R.M.Schust. & N.Kitag.
- 1 ***S. pearsonii*** (Spruce) R.M.Schust.

18 ***Sphenolobus*** (Lindb.) Berggr.
- 1 ***S. minutus*** (Schreb. ex D.Crantz) Berggr. [*Anastrophyllum minutum* (Schreb.) R.M.Schust., *Anastrophyllum minutum* var. *weberi* (Mart.) Kartt.]
- 2 ***S. saxicola*** (Schrad.) Steph. [*Anastrophyllum saxicola* (Schrad.) R.M.Schust.]

19 ***Tetralophozia*** (R.M.Schust.) Schljakov
- 1 ***T. filiformis*** (Steph.) Urmi
- 2 ***T. setiformis*** (Ehrh.) Schljakov

Cephaloziaceae Mig.
Cephalozioideae Müll.Frib.

20 ***Cephalozia*** (Dumort.) Dumort.
- 1 ***C. ambigua*** C.Massal. [*Cephalozia bicuspidata* var. *paludosa* Jørg. ex Damsh. *nom. inval*.]
- 2 ***C. bicuspidata*** (L.) Dumort.
  - a subsp. ***bicuspidata***
  - b subsp. ***lammersiana*** (Huebener) R.M.Schust. [8]

[7] *Schizophyllopsis sphenoloboides* was nested within *Anastrophyllum* in the study by Vilnet et al. (2010) which led Stotler and Crandall-Stotler (2017) to retain it in that genus. As it is the type of *Schizophyllopsis*, this means that the whole genus would disappear. However, Vilnet et al. (2010) did not include any other member of the genus, or the type of *Anastrophyllum*, in their studies. We thus retain *Schizophyllopsis* pending further studies.

[8] *Cephalozia bicuspidata* subsp. *lammersiana* has a long history of debate on whether it is worth recognizing at any level. The issue requires a molecular study before it can be resolved.

3 ***C. crossii*** Spruce [9]
4 ***C. lacinulata*** (J.B.Jack ex Gottsche & Rabenh.) Spruce
5 ***C. macounii*** (Austin) Austin

21 ***Fuscocephaloziopsis*** Fulford [*Pleurocladula* Grolle]
1 ***F. affinis*** (Lindb. ex Steph.) Váňa & L.Söderstr. [*Cephalozia affinis* Lindb. ex Steph., *Pleurocladula affinis* (Lindb. ex Steph.) Konstant., Vilnet & Troitsky]
2 ***F. albescens*** (Hook.) Váňa & L.Söderstr. [*Pleurocladula albescens* (Hook.) Grolle]
a var. ***albescens***
b var. ***islandica*** (Nees) Váňa & L.Söderstr. [*Pleurocladula albescens* var. *islandica* (Nees) L.Söderstr. & Váňa]
3 ***F. catenulata*** (Huebener) Váňa & L.Söderstr. [*Cephalozia catenulata* (Huebener) Lindb., *Pleurocladula catenulata* (Huebener) Konstant., Vilnet & Troitsky]
a subsp. ***catenulata*** [10]
4 ***F. connivens*** (Dicks.) Váňa & L.Söderstr. [*Cephalozia connivens* (Dicks.) Lindb., *Pleurocladula connivens* (Dicks.) Konstant., Vilnet & Trotsky]
a subsp. ***connivens*** [*Cephalozia connivens* var. *compacta* (Warnst.) W.E.Nicholson ex Macvicar] [11]
5 ***F. crassifolia*** (Lindenb. & Gottsche) Váňa & L.Söderstr. [*Cephalozia crassifolia* (Lindenb. & Gottsche) Fulford]
6 ***F. leucantha*** (Spruce) Váňa & L.Söderstr. [*Cephalozia leucantha* Spruce, *Pleurocladula leucantha* (Spruce) Konstant., Vilnet & Troitsky, *Cephalozia leucantha* var. *robusta* Schljakov]
7 ***F. loitlesbergeri*** (Schiffn.) Váňa & L.Söderstr. [*Cephalozia loitlesbergeri* Schiffn., *Pleurocladula loitlesbergeri* (Schiff.) Konstant., Vilnet & Troitsky]
8 ***F. lunulifolia*** (Dumort.) Váňa & L.Söderstr. [*Cephalozia lunulifolia* (Dumort.) Dumort., *Pleurocladula lunulifolia* (Dumort.) Konstant., Vilnet & Troitsky]
9 ***F. macrostachya*** (Kaal.) Váňa & L.Söderstr. [*Cephalozia macrostachya* Kaal., *Pleurocladula macrostachya* (Kaal.) Konstant., Vilnet & Troitsky]
a subsp. ***macrostachya*** [12]
i. var. ***macrostachya***
ii. var. ***spiniflora*** (Schiffn.) Váňa & L.Söderstr.
10 ***F. pleniceps*** (Austin) Váňa & L.Söderstr. [*Cephalozia pleniceps* (Austin) Lindb., *Pleurocladula pleniceps* (Austin) Konstant., Vilnet & Troitsky]
a var. ***pleniceps*** [*Cephalozia pleniceps* var. *sphagnorum* (C.Massal.) Jørg.] [13]

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[9] *Cephalozia crossii* was reported from the Canary Islands (Schäfer-Verwimp and Váňa in Ellis et al. 2018).
[10] *Fuscocephaloziopsis catenulata* subsp. *nipponica* (S.Hatt.) Váňa & L.Söderstr. occurs in SE Asia.
[11] *Fuscocephaloziopsis connivens* subsp. *fissa* (Steph.) Váňa & L.Söderstr. occurs in Africa and SE Asia and subsp. *sandwicensis* (Mont.) Váňa & L.Söderstr. in Hawaii, Tahiti and Central America.
[12] *Fuscocephaloziopsis macrostachya* subsp. *australis* (R.M.Schust.) Váňa & L.Söderstr. occurs in SE USA.

22 ***Nowellia*** Mitt.
Section *Nowellia*
1 ***N. curvifolia*** (Dicks.) Mitt.

Odontoschismatoideae H.Buch ex Grolle.

23 ***Odontoschisma*** (Dumort.) Dumort. [*Cladopodiella* H.Buch]
section *Cladopodiella* (H.Buch) Gradst., S.C.Aranda & Vanderp.
1 ***O. francisci*** (Hook.) L.Söderstr. & Váňa [*Cladopodiella francisci* (Hook.) Jørg.]
section *Denudata* R.M.Schust.
2 ***O. denudatum*** (Mart.) Dumort.
a subsp. ***denudatum*** [14]
3 ***O. elongatum*** (Lindb.) A.Evans
4 ***O. macounii*** (Austin) Underw.
5 section *Neesii* Gradst., S.C.Aranda & Vanderp.
6 ***O. fluitans*** (Nees) L.Söderstr. & Váňa [*Cladopodiella fluitans* (Nees) H.Buch]
7 section Odontoschisma
8 ***O. sphagni*** (Dicks.) Dumort. [*Odontoschisma prostratum* (Sw.) Trevis.] [15]

Cephaloziellaceae Douin [16]

24 ***Cephaloziella*** (Spruce) Schiffn. [*Dichiton* Mont.] [17]
subgenus Cephaloziella
1 ***C. arctogena*** (R.M.Schust.) Konstant. [*Cephaloziella rubella* subsp. *arctogena* (R.M.Schust.) R.M.Schust. & Damsh.]
2 ***C. aspericaulis*** Jørg.
3 ***C. baumgartneri*** Schiffn.
4 ***C. divaricata*** (Sm.) Schiffn.
a var. ***divaricata*** [*Cephaloziella divaricata* var. *rupestris* (C.E.O.Jensen) Damsh. *nom. inval*.]
b var. ***scabra*** (M.Howe) Haynes [*Cephaloziella divaricata* var. *asperifolia* (Taylor) Damsh.] [18]
5 ***C. elachista*** (J.B.Jack ex Gottsche & Rabenh.) Schiffn.
a var. ***elachista*** [19]

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[13] *Fuscocephaloziopsis pleniceps* var. *caroliniana* (R.M.Schust.) Váňa & L.Söderstr. occurs in SE USA.
[14] *Odontoschisma denudatum* subsp. *naviculare* (Steph.) Gradst., S.C.Aranda & Vanderp. occurs in E Asia and subsp. *sandvicense* (Ångstr.) Gradst., S.C.Aranda & Vanderp. in Japan and Hawaii.
[15] *Odontoschisma prostratum* was recently synonymised by Aranda et al. (2014) based on molecular data.
[16] Cephaloziellaceae is here treated in a very broad sense following Váňa et al. (2013). Several genera (*Obtusifolium*, *Oleolophozia*, *Protolophozia*) have recently been excluded from other families and been indicated to belong closer to Cephaloziellaceae, but there is no comprehensive study of this phylogenetic region. To avoid monogeneric families of doubtful value the WCL (Söderström et al. 2016) included everything in the only available family name, Cephaloziellaceae, as a sort of 'superfamily', which we are following here.
[17] *Cephaloziella* is one of the most difficult liverwort genera. Almost all taxa are difficult to determine, and their taxonomy and distribution is poorly understood. Bell et al. (2013) provided evidence that the molecular data do not match morphological identifications. Type-based studies using molecular data are urgently needed.
[18] The taxonomic value of *Cephaloziella divaricata* var. *scabra* is controversial. In Central Europe var. *scabra* intergrades with var. *divaricata* and is possibly only a morph of shady habitats (Köckinger 2017).
[19] *Cephaloziella elachista* var. *spinophylla* (C.Gao) C.Gao occurs in China.

6 ***C. elegans*** (Heeg) Schiffn. [*Cephaloziella rubella* var. *elegans* (Heeg) R.M.Schust.]
7 ***C. grimsulana*** (J.B.Jack ex Gottsche & Rabenh.) Lacout.
8 ***C. hampeana*** (Nees) Schiffn. ex Loeske [*Cephaloziella hampeana* var. *subtilis* (Velen) Macvicar]
9 ***C. massalongi*** (Spruce) Müll.Frib. [*Cephaloziella massalongi* var. *compacta* (Jørg.) Müll.Frib.]
10 ***C. nicholsonii*** Douin
11 ***C. phyllacantha*** (C.Massal. & Carestia) Müll.Frib.
12 ***C. polystratosa*** (R.M.Schust. & Damsh.) Konstant. [*Cephaloziella divaricata* var. *polystratosa* (R.M.Schust. & Damsh.) Potemkin] [20]
13 ***C. rubella*** (Nees) Warnst. [*Cephaloziella rubella* var. *sullivantii* (Austin) Müll.Frib. ex R.M.Schust., *Cephaloziella rubella* var. *bifida* (Lindb.) Douin, *Cephaloziella rubella* var. *pulchella* (C.E.O.Jensen) R.M.Schust.]
14 ***C. spinigera*** (Lindb.) Jørg. [*Cephaloziella spinigera* f. *striatula* (C.E.O.Jensen) Damsh., *Cephaloziella subdentata* Warnst.]
15 ***C. stellulifera*** (Taylor ex Carrington & Pearson) Croz. [*Cephaloziella stellulifera* var. *limprichtii* (Warnst.) Macvicar]
16 ***C. uncinata*** R.M.Schust.
a var. ***uncinata*** [21]
17 ***C. varians*** (Gottsche) Steph. [*Cephaloziella alpina* Douin, *Cephaloziella arctica* Bryhn & Douin, *Cephaloziella varians* var. *arctica* (Bryhn & Douin) Damsh., *Cephaloziella varians* var. *scabra* (S.W.Arnell) Damsh.]

subgenus *Dichiton* (Mont.) Müll.Frib.
18 ***C. calyculata*** (Durieu & Mont.) Müll.Frib.
19 ***C. integerrima*** (Lindb.) Warnst. [*Dichiton integerrimum* (Lindb.) H.Buch, *Cephaloziella integerrima* var. *obtusa* Müll.Frib.]

subgenus *Evansia* (Douin & Schiffn.) Müll.Frib.
20 ***C. dentata*** (Raddi) Steph.

subgenus *Prionolobus* (Spruce) Müll.Frib.
21 ***C. granatensis*** (J.B.Jack ex Steph.) Fulford
22 ***C. turneri*** (Hook.) Müll.Frib.

25 ***Obtusifolium*** S.W.Arnell
1 ***O. obtusum*** (Lindb.) S.W.Arnell (*Lophozia obtusa* (Lindb.) A.Evans)

26 ***Oleolophozia*** L.Söderstr., De Roo & Hedd.
1 ***O. perssonii*** (H.Buch & S.W.Arnell) L.Söderstr., De Roo & Hedd. [*Lophozia perssonii* H.Buch & S.W.Arnell, *Lophoziopsis perssonii* (H.Buch & S.W.Arnell) Konstant. & Vilnet]

27 ***Protolophozia*** (R.M.Schust.) Schljakov
1 ***P. elongata*** (Steph.) Schljakov [*Lophozia elongata* Steph.]
2 ***P. herzogiana*** (E.A.Hodgs. & Grolle) Váňa & L.Söderstr. [*Lophozia herzogiana* E.A.Hodgs. & Grolle]

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[20] *Cephalozia polystratosa* was elevated to species rank by Konstantinova (2000b). It is reported from several places in European Russia and Svalbard.

[21] *Cephaloziella uncinata* var. *brevigyna* R.M.Schust. & Damsh. and var. *sphagnicola* R.M.Schust. occurs in North America. Schuster (1988; cf. also Damsholt 2013) also described a var. *mamillosa* R.M.Schust. & Damsh. from Greenland, but that name is invalid and we do not validate it here.

Lophoziaceae Cavers

28 ***Heterogemma*** (Jørg.) Konstant. & Vilnet [*Massularia* Schljakov *nom. illeg.*]
- 1 ***H. capitata*** (Hook.) Konstant. & Vilnet [*Lophozia capitata* (Hook.) Macoun]
- 2 ***H. laxa*** (Lindb.) Konstant. & Vilnet [*Lophozia laxa* (Lindb.) Grolle, *Massularia laxa* (Lindb.) Schljakov]

29 ***Lophozia*** (Dumort.) Dumort. [22]
- 1 ***L. ascendens*** (Warnst.) R.M.Schust. [*Lophozia gracillima* H.Buch]
- 2 ***L. ciliata*** Damsh., L.Söderstr. & H.Weibull
- 3 ***L. fuscovirens*** Bakalin & Vilnet [23]
- 4 ***L. guttulata*** (Lindb. & Arnell) A.Evans [*Lophozia porphyroleuca* (Nees) Schiffn. *nom. illeg*., *Lophozia longiflora* auct. (sensu Grolle and Long 2000, Söderström et al. 2002, Damsholt 2002), *Lophozia longiflora* var. *guttulata* (Lindb. & Arnell) Schljakov] [24]
- 5 ***L. lantratoviae*** Bakalin [25]
- 6 ***L. longiflora*** (Nees) Schiffn. [*Lophozia ventricosa* var. *longiflora* (Nees) Macoun, *Lophozia ventricosa* var. *uliginosa* auct. (sensu Söderström et al. 2002, Damsholt 2002)] [26]
- 7 ***L. murmanica*** Kaal. [*Lophozia groenlandica* auct. (sensu Grolle and Long 2000, Söderström et al. 2002), *L. wenzelii* var. *groenlandica* auct. (sensu Bakalin 2005, Konstantinova et al. 2009a), *Lophozia confertifolia* auct. (sensu Konstantinova et al. 1992), *Lophozia heteromorpha* R.M.Schust. & Damsh.] [27]
- 8 ***L. savicziae*** Schljakov [*Lophozia silvicola* var. *grandiretis* H.Buch & S.W.Arnell, *Lophozia ventricosa* var. *grandiretis* (H.Buch & S.W.Arnell) R.M.Schust. & Damsh., *Lophozia murmanica* auct. (sensu Schljakov 1969)]
- 9 ***L. schusteriana*** Schljakov [*Lophozia groenlandica* auct. (sensu Schuster 1969)] [28]
- 10 ***L. silvicola*** H.Buch [*Lophozia ventricosa* auct. (sensu Müller 1954, Schljakov 1980, Meinunger and Schröder 2007, Köckinger 2017; non Grolle and Long 2000), *Lophozia ventricosa* var. *silvicola* (H.Buch) E.W.Jones] [29]

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[22] The genus *Lophozia* includes many taxonomically and nomenclaturally problematic taxa, as outlined in Söderström et al. (2013).

[23] *Lophozia fuscovirens* was recently described from the Russian Far East (Bakalin and Vilnet 2019) and is found also on Svalbard (N. Konstantinova in prep.).

[24] For *Lophozia guttulata*, see footnote on *Lophozia longiflora.*

[25] *Lophozia lantratoviae* is a recently described species reported from Caucasus by Konstantinova et al. (2009b).

[26] Since Schljakov (1980), *Lophozia longiflora* has been used to include *Lophozia guttulata*, a species mostly restricted to moist dead wood habitats. *Lophozia longiflora* was lectotypified by Bakalin (2016). The lectotype corresponds to the concept of Müller (1954), Saukel (1985), Meinunger and Schröder (2007), Bakalin (2016) and Köckinger (2017), describing a species occuring mostly on peaty soil and in rocky habitats, but not the concept of Grolle and Long (2000), which corresponds to our *Lophozia guttulata*.

[27] *Lophozia murmanica* was placed in synonymy with *Lophozia groenlandica* with a question mark (together with *Lophozia heteromorpha*, also with a question mark) by Schljakov (1998). This concept has led to questionable reports of *Lophozia murmanica* from many areas of Europe.

[28] *Lophozia schusteriana* is a new name given to *Lophozia groenlandica* sensu Schuster (1969) by Schljakov (1975). Schljakov also rejected all reports from Europe but Vilnet et al. (2010) reported it later from Svalbard.

[29] For *Lophozia silvicola*, see footnote under *Lophozia ventricosa.*

11 ***L. silvicoloides*** N.Kitag. [30]
12 ***L. subapiculata*** R.M.Schust. & Damsh. [31]
13 ***L. ventricosa*** (Dicks.) Dumort. [*Lophozia groenlandica* auct. (sensu Schljakov 1980, 1998), *Lophozia confertifolia* auct. (sensu Schljakov 1975, 1998, Ştefănuţ 2008), *Lophozia murmanica* auct. (sensu Schljakov 1970), *Lophozia ventricosa* var. *confusa* R.M.Schust.] [32]
14 ***L. wenzelii*** (Nees) Steph. [*Lophozia groenlandica* auct. (sensu Damsholt 1994, 2002, Ştefănuţ 2008), *Lophozia confertifolia* Schiffn. (sensu Damsholt 2002, Köckinger 2017), *Lophozia ventricosa* var. *uliginosa* Breidl. ex Schiffn., *Lophozia iremelensis* Schljakov] [33]
a var. ***lapponica*** H.Buch & S.W.Arnell
b var. ***litoralis*** (Arnell) Bakalin
c var. ***massularioides*** Bakalin
d var. ***wenzelii***

30 ***Lophoziopsis*** Konstant. & Vilnet
1 ***L. excisa*** (Dicks.) Konstant. & Vilnet [*Lophozia excisa* (Dicks.) Dumort.]
a var. ***elegans*** (R.M.Schust.) Konstant. & Vilnet [*Schistochilopsis elegans* (R.M. Schust.) Konstant.]
b var. ***excisa*** [*Lophozia excisa* var. *cylindracea* (Dumort.) Müll.Frib.] [34]
2 ***L. jurensis*** (Meyl. ex Müll.Frib.) Mamontov & Vilnet [*Lophozia jurensis* Meyl. ex Müll. Frib., *Lophozia propagulifera* auct. eur., *Lophoziopsis*

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[30] *Lophozia silvicoloides* is originally described from E Asia and recently reported from Svalbard (Vilnet et al. 2005) and European Russia in Murmansk and Bashkiriya provinces (Bakalin 2001).

[31] *Lophozia subapiculata* is a critical taxon that was synonymised with *Lophozia ventricosa* by Bakalin (2005) but recognised as a separate species and reported for Svalbard by Konstantinova & Savchenko (2018).

[32] The *Lophozia ventricosa*/*wenzelii* complex has never been studied in detail worldwide using both molecular and morphological methods. Vilnet et al. (2010) and de Roo & al (2007) concentrated on other problems and did not include a sufficient number of specimens of these and related taxa to include the full morphological variation of this group. The taxonomy proposed here is based mostly on morphological studies (which, however, are contradictory!) and is therefore provisional pending future research
The name *Lophozia ventricosa* has been applied to different concepts since Buch (1929) described *Lophozia silvicola* (see also Buch 1932) and has often included the latter as synonym. The neotype chosen by Grolle and Long (2000) for *Lophozia ventricosa* define it as different from *Lophozia silvicola*. However, there are some doubts if this neotype represents *Lophozia ventricosa* sensu Söderström et al. (2016) or is a form of *Lophozia wenzelii* (see Meinunger and Schröder 2007, Köckinger 2017). *Lophozia ventricosa* is here understood as a plant with the overall morphology and anatomy of *Lophozia silvicola* but showing homogeneous granular oil bodies. The neotype of Grolle and Long (2000) needs a reinvestigation as it approaches what we understand as *Lophozia wenzelii*.

[33] *Lophozia wenzelii* is very close to *Lophozia ventricosa* according to molecular studies by De Roo & al (2007) and Vilnet et al. (2010), but refer to the footnote under *Lophozia ventricosa* concerning the neotype of the latter species. Söderström et al. (2016) did not accept any subspecific taxa but we list some here accepted in the revision of *Lophozia* for Russia (Bakalin 2005) to draw attention to the need for further studies of this complex.
Lophozia groenlandica has been used in at least three different senses (see Söderström et al. 2013). Although being one of the oldest names in the complex, we refrain from using it in any sense until its affinity is better defined. Schljakov (in Konstantinova et al. 1992) proposed to reject the name *Lophozia groenlandica* (but never formally did it) and changed it for *Lophozia confertifolia*.
Lophozia confertifolia has also been used in several senses and we here refrain to use it in any specific sense until it is lectotypified (and possibly epitypified if needed).

[34] *Lophoziopsis excisa* var. *infuscata* (R.M.Schust. & Damsh.) Konstant. & Vilnet and var. *succulenta* (R.M.Schust. & Damsh.) Konstant. & Vilnet. occur in arctic North America and Siberia.

propagulifera auct. eur., *Lophozia latifolia* R.M.Schust., *Lophoziopsis latifolia* (R.M.Schust.) Köckinger] [35]

3 ***L. longidens*** (Lindb.) Konstant. & Vilnet [*Lophozia longidens* (Lindb.) Macoun]
- a subsp. ***arctica*** (R.M.Schust.) Váňa & L.Söderstr. [*Lophoziopsis rubrigemma* f. *arctica* (R.M.Schust.) Bakalin]
- b subsp. ***longidens***

4 ***L. pellucida*** (R.M.Schust.) Konstant. & Vilnet [*Lophozia pellucida* R.M.Schust.]
- a var. ***minor*** (R.M.Schust.) L.Söderstr. & Váňa
- b var. ***pellucida***

5 ***L. polaris*** (R.M.Schust.) Konstant. & Vilnet [*Lophozia polaris* (R.M.Schust.) R.M.Schust & Damsh.]
- a var. ***polaris***
- b var. ***sphagnorum*** (R.M.Schust.) Konstant. & Vilnet

6 ***L. rubrigemma*** (R.M.Schust.) Konstant. & Vilnet [*Lophozia rubrigemma* R.M.Schust.]

31 ***Trilophozia*** (R.M.Schust.) Bakalin

1 ***T. quinquedentata*** (Huds.) Bakalin [*Tritomaria quinquedentata* (Huds.) H.Buch, *Tritomaria quinquedentata* subsp. *turgida* (Lindb.) Damsh., *Trilophozia quinquedentata* subsp. *turgida* (Lindb.) Konstant., *Tritomaria quinquedentata* f. *gracilis* (C.E.O.Jensen) R.M.Schust., *Tritomaria quinquedentata* var. *dentata* S.W.Arnell *nom. inval*., *Tritomaria quinquedentata* var. *grandiretis* H.Buch & S.W.Arnell]
- a var. ***quinquedentata*** [36]

32 ***Tritomaria*** Schiffn. ex Loeske

1 ***T. exsecta*** (Schmidel) Schiffn. ex Loeske
- a subsp. ***exsecta*** [37]

2 ***T. exsectiformis*** (Breidl.) Schiffn. ex Loeske
- a subsp. ***arctica*** R.M.Schust.
- b subsp. ***exsectiformis*** [38]

3 ***T. scitula*** (Taylor) Jørg.

Scapaniaceae Mig.

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[35] *Lophoziopsis jurensis* is a problematic taxon. It was synonymised with *Lophozia latifolia* by Schljakov (1980) and with *Lophozia propagulifera* by Bakalin (2005). Borovichev and Mamontov (2017; see also Köckinger 2017) rejected the synonymy, as European specimens differed molecularily from specimens named *Lophoziopsis propagulifera* from Kamchatka. However, there is as yet no study to determine whether *Lophoziopsis latifolia* (type from arctic North America), specimens of *Lophoziopsis propagulifera* from the Southern Hemisphere (type from South Georgia) and *Lophoziopsis jurensis* (type from the Alps) are genetically different. We here list only one species, assuming that the Southern Hemisphere taxon is different, and following Schljakov (1980) in regarding *Lophoziopsis latifolia* as a synonym of *Lophoziopsis jurensis*.

[36] *Trilophozia quinquedentata* var. *assymetrica* (Horik.) L.Söderstr. & Váňa occurs in E Asia. *Tritomaria quinquedentata* is a polymorphic species with many infraspecific taxa described, but the value of them are questioned. The only infrataxon known to be included in a molecular study (subsp. *turgida*) was nested among other specimens morphologically belonging to subsp. *quinquedentata* (De Roo et al. 2007).

[37] *Tritomaria exsecta* subsp. *novaezelandia* J.J.Engel occurs in New Zealand.

[38] *Tritomaria exsectiformis* subsp. *camerunensis* S.W.Arnell ex Váňa occurs in Africa.

33 ***Diplophyllum*** (Dumort.) Dumort.
section *Diplophyllum*
1 ***D. albicans*** (L.) Dumort.
section *Protodiplophyllum* (R.M.Schust.) Váňa & L.Söderstr.
2 ***D. obtusatum*** (R.M.Schust.) R.M.Schust. [39]
3 ***D. obtusifolium*** (Hook.) Dumort.
a subsp. ***obtusifolium*** [40]
4 ***D. taxifolium*** (Wahlenb.) Dumort.
a var. ***taxifolium*** [*Diplophyllum taxifolium* var. *macrosticta* H.Buch] [41]

34 ***Douinia*** (C.E.O.Jensen) H.Buch
1 ***D. ovata*** (Dicks.) H.Buch

35 ***Pseudotritomaria*** Konstant. & Vilnet
1 ***P. heterophylla*** (R.M.Schust.) Konstant. & Vilnet [42]

36 ***Saccobasis*** H.Buch
1 ***S. polita*** (Nees) H.Buch [*Tritomaria polita* (Nees) Jørg.]
2 ***S. polymorpha*** (R.M.Schust.) Schljakov [*Tritomaria polita* subsp. *polymorpha* R.M.Schust.] [43]

37 ***Scapania*** (Dumort.) Dumort.
subgenus *Gracilidae* (H.Buch) Váňa, Hentschel, Joch.Müll. & Heinrichs
1 ***S. gracilis*** Lindb.
subgenus *Plicaticalyx* Müll.Frib.
section *Planifoliae* (Müll.Frib.) Potemkin
2 ***S. nimbosa*** Taylor
3 ***S. ornithopodioides*** (With.) Waddell
subgenus *Scapania*
section *Aequilobae* (Müll.Frib.) H.Buch
4 ***S. aequiloba*** (Schwägr.) Dumort.
5 ***S. aspera*** M.Bernet & Bernet
section *Apiculatae* H.Buch
6 ***S. apiculata*** Spruce
7 ***S. carinthiaca*** J.B.Jack ex Lindb. [44]
a var. ***carinthiaca***

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[39] *Diplophyllum obtusatum* is close to or possibly conspecific with *Diplophyllum obtusifolium*, differing mainly in being autoicious vs. paroicious. Urmi (2017) regarded them as conspecific but did not formally treat them as such. In addition, Bakalin and Vilnet (2018) treated all reports of both species from Asia as belonging to their new species, *Diplophyllum sibiricum* Vilnet & Bakalin, and regarded *Diplophyllum obtusatum* as an American taxon of unclear status. However, they did not include any American or European specimen of *Diplophyllum obtusatum* to confirm this conclusion.

[40] *Diplophyllum obtusifolium* subsp. *domesticum* (Gottsche) Váňa occurs in the Subantarctic.

[41] *Diplophyllum taxifolium* var. *mucronatum* R.M.Schust. occurs in North America.

[42] *Pseudotritomaria heterophylla* is reported from Franz Josef Land but “the material is poor” (Konstantinova and Potemkin 1996) and the taxon was not included in the list of Grolle and Long (2000). We include it here with some hesitation.

[43] *Saccobasis polymorpha* was included (as *Tritomaria polymorpha*) in *Tritomaria polita* by Grolle and Long (2000).

[44] There are two morphotypes of *Scapania carianthiaca* (*Scapania carinthiaca* s.str. and *Scapania massalongi*), which were for a long time treated as separate taxa (Müller 1954), before being synonymised by Potemkin (1999). Most records in Europe belong to the *massalongi*-morphototype, while the *carinthiaca*-morphotype is very rare. Further studies with fertile plants are desirable, especially as two morphotypes can be distinguished in the Alps, following Meinunger and Schröder (2007) and others.

b var. ***massalongi*** Müll.Frib.
8 ***S. umbrosa*** (Schrad.) Dumort.
section *Compactae* (Müll.Frib.) H.Buch
9 ***S. compacta*** (Roth) Dumort.
10 ***S. kaurinii*** Ryan
11 ***S. spitsbergensis*** (Lindb.) Müll.Frib.
section *Curtae* (Müll.Frib.) H.Buch
12 ***S. curta*** (Mart.) Dumort.
a var. ***curta***
b var. ***grandiretis*** R.M.Schust.
c var. ***isoloba*** R.M.Schust.
13 ***S. helvetica*** Gottsche
14 ***S. irrigua*** Nees
a subsp. ***irrigua*** [*Scapania irrigua* var. *rubescens* H.Buch]
b subsp. ***rufescens*** (Loeske) R.M.Schust.
15 ***S. lingulata*** H.Buch
a var. ***lingulata***
b var. ***microphylla*** (Warnst.) R.M.Schust.
16 ***S. mucronata*** H.Buch
17 ***S. obcordata*** (Berggr.) S.W.Arnell [*Scapania paradoxa* R.M.Schust.]
18 ***S. parvifolia*** Warnst.
19 ***S. praetervisa*** Meyl. [*Scapania mucronata* subsp. *praetervisa* (Meyl.) R.M.Schust.]
20 ***S. scandica*** (Arnell & H.Buch) Macvicar
a var. ***argutedentata*** H.Buch
b var. ***grandiretis*** (Schljakov) Schljakov
c var. ***scandica*** [45]
21 ***S. uliginosa*** (Lindenb.) Dumort.
22 ***S. zemliae*** S.W.Arnell
section *Cuspiduligerae* H.Buch
23 ***S. cuspiduligera*** (Nees) Müll.Frib.
a var. ***cuspiduligera*** [46]
section *Hyperboreae* Váňa, Hentschel, Joch.Müll. & Heinrichs
24 ***S. hyperborea*** Jørg.
25 ***S. paludicola*** Loeske & Müll.Frib. [*Scapania paludicola* var. *rufescens* Damsh. *nom. inval*.]
a var. ***paludicola*** [47]
b var. ***rotundiloba*** R.M.Schust. ex Konstant. & L.Söderstr.
26 ***S. tundrae*** (Arnell) H.Buch
section *Kaalaasia* (H.Buch) Jørg.
27 ***S. calcicola*** (Arnell & J.Perss.) Ingham
28 ***S. gymnostomophila*** Kaal.
29 ***S. ligulifolia*** R.M.Schust.
section *Nemorosae* (Müll.Frib.) H.Buch
30 ***S. crassiretis*** Bryhn

[45] *Scapania scandica* var. *dimorpha* R.M.Schust. occurs in North America
[46] *Scapania cuspiduligera* var. *diplophyllopsis* R.M.Schust. occurs in North America.
[47] *Scapania paludicola* var. *viridigemma* R.M.Schust. occurs in North America.

31 ***S. degenii*** Schiffn. ex Müll.Frib. [*Scapania brevicaulis* auct. eur. non Taylor, *Scapania degenii* var. *dubia* R.M.Schust., *Scapania brevicaulis* var. *dubia* (R.M.Schust.) Damsh.] [48]
32 ***S. nemorea*** (L.) Grolle
section *Scapania*
33 ***S. obscura*** (Arnell & C.E.O.Jensen) Schiffn.
34 ***S. paludosa*** (Müll.Frib.) Müll.Frib. [*Scapania paludosa* var. *isoloba* Müll.Frib., *Scapania paludosa* var. *rubiginosa* müll.Frib., *Scapania paludosa* var. *vogesiaca* Müll.Frib.]
35 ***S. subalpina*** (Nees ex Lindenb.) Dumort.
a var. ***subalpina*** [49]
36 ***S. undulata*** (L.) Dumort. [*Scapania undulata* var. *aequatiformis* (De Not.) C.Massal & Carestia, *Scapania undulata* var. *dentata* (Dumort.) Jørg., *Scapania undulata* var. *oakesii* (Austin) H.Buch]
section *Scapaniella* (H.Buch) Potemkin
37 ***S. glaucocephala*** (Taylor) Austin
a var. ***glaucocephala*** [50]
38 ***S. scapanioides*** (C.Massal.) Grolle [*Scapania glaucocephala* var. *scapanioides* (C.Massal.) Damsh.]
section *Simmonsiae* (R.M.Schust.) Váňa, Hentschel, Joch.Müll. & Heinrichs
39 ***S. simmonsii*** Bryhn & Kaal.
section *Sphaeriferae* Konstant. & Potemkin
40 ***S. sphaerifera*** H.Buch & Tuom.
section *Verrucosae* Potemkin
41 ***S. verrucosa*** Heeg

38 ***Schistochilopsis*** (N.Kitag.) Konstant.
1 ***S. grandiretis*** (Lindb. ex Kaal.) Konstant. [*Lophozia grandiretis* (Lindb. ex Kaal.) Schiffn., *Lophozia grandiretis* var. *parviretis* R.M.Schust., *Lophozia grandiretis* var. *proteidea* (Arnell) Arnell, *Lophozia grandiretis* var. *parviretis* R.M.Schust.]
2 ***S. hyperarctica*** Konstant. & L.Söderstr. [*Lophozia hyperarctica* R.M.Schust.]
3 ***S. incisa*** (Schrad.) Konstant. [*Lophozia incisa* (Schrad.) Dumort., *Massularia incisa* (Schrad.) Schljakov, *Schistochilopsis incisa* var. *inermis* (Müll.Frib.) Konstant.]
4 ***S. opacifolia*** (Culm. ex Meyl.) Konstant. [*Lophozia opacifolia* Culm. ex Meyl., *Lophozia incisa* subsp. *opacifolia* (Culm. ex Meyl.) R.M.Schust. & Damsh.]

Acrobolbaceae E.A.Hodgs.
Acrobolboideae R.M.Schust. ex Briscoe

39 ***Acrobolbus*** Nees [*Tylimanthus* Mitt.]
1 ***A. azoricus*** (Grolle & Perss.) Briscoe [*Tylimanthus azoricus* Grolle & Perss.]

[48] *Scapania degenii* was synonymised with *Scapania brevicaulis* by Potemkin (1998) but recognised by Konstantinova et al. (2009a). *Scapania brevicaulis* s.str. is an American taxon that has never been reported from Europe without *Scapania degenii* being included as as a synonym.
[49] *Scapania subalpina* var. *haynesiae* Frye & L.Clark and var. *muddiae* C.D.Bird & W.S.Hong occurs in North America.
[50] *Scapania glaucocephala* var. *saxicola* (R.M.Schust.) Potemkin occurs in North America.

2 ***A. madeirensis*** (Grolle & Perss.) Briscoe [*Tylimanthus madeirensis* Grolle & Perss.]
3 ***A. wilsonii*** Nees
a var. ***wilsonii*** [51]

Antheliaceae R.M.Schust.

40 ***Anthelia*** (Dumort.) Dumort.
1 ***A. julacea*** (L.) Dumort.
2 ***A. juratzkana*** (Limpr.) Trevis.

Arnelliaceae Nakai

41 ***Arnellia*** Lindb.
1 ***A. fennica*** (Gottsche) Lindb.

Calypogeiaceae Arnell

42 ***Calypogeia*** Raddi
subgenus *Asperifoliae* (Warnst.) R.M.Schust.
1 ***C. arguta*** Nees & Mont.
subgenus *Calypogeia*
2 ***C. azorica*** Bischl.
3 ***C. azurea*** Stotler & Crotz
4 ***C. fissa*** (L.) Raddi
a subsp. ***fissa***
b subsp. ***neogaea*** R.M.Schust.
c var. ***paludosa*** (Warnst.) Damsh. [52]
5 ***C. integristipula*** Steph.
6 ***C. muelleriana*** (Schiffn.) Müll.Frib.
a subsp. ***muelleriana*** [*Calypogeia muelleriana* var. *erecta* (Müll.Frib.) Müll.Frib.] [53]
7 ***C. neesiana*** (C.Massal. & Carestia) Müll.Frib.
a subsp. ***neesiana*** [*Calypogeia neesiana* var. *hygrophila* Müll.Frib., *Calypogeia neesiana* var. *repanda* (Meyl.) Meyl.] [54]
8 ***C. sphagnicola*** (Arnell & J.Perss.) Warnst. & Loeske
9 ***C. suecica*** (Arnell & J.Perss.) Müll.Frib.

43 ***Mnioloma*** Herzog
subgenus *Caracoma* (Bischl.) R.M.Schust.
1 ***M. fuscum*** (Lehm.) R.M.Schust.

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[51] *Acrobolbus wilsonii* var. *andinus* Spruce occurs in South America. Whether it belongs to *Acrobolbus wilsonii* or some other species is unclear, as *Acrobolbus wilsonii* is normally considered to be a European endemic.

[52] Damsholt (2017) transferred *Calypogeia sphagnicola* f. *paludosa* (Warnst.) R.M.Schust. to *Calypogeia fissa.* Buczkowska et al. (2018) included both 'f. *sphagnicola*' and 'f. *paludosa*' in their study on, primarily, the *Calypogeia* species with blue oil bodies. However, in their molecular phylogenetic tree, '*paludosa*' came out distinctly separated from '*sphagnicola*' and closer to *Calypogeia fissa* (supporting Damsholt's view), although far enough from it that it should perhaps deserve recognition at species level. For now, to avoid premature nomenclatural changes we treat it as a variety without affiliation to any of the subspecies pending further research.

[53] *Calypogeia muelleriana* subsp. *blomquistii* R.M.Schust. occurs in North America.

[54] *Calypogeia neesiana* subsp. *subalpina* (Inoue) Inoue occurs in Japan.

Endogemmaceae Konstant. [55]

44 ***Endogemma*** Konstant.
- 1 ***E. caespiticia*** (Lindenb.) Konstant., Vilnet & A.V.Troitsky [*Jungermannia caespiticia* Lindenb.]

Geocalycaceae H.Klinggr.

45 ***Geocalyx*** Nees
- 1 ***G. graveolens*** (Schrad.) Nees

Gymnomitriaceae H.Klinggr.
Gymnomitrioideae T.Jensen

46 ***Gymnomitrion*** Corda [*Apomarsupella* R.M.Schust.]
- 1 ***G. adustum*** Nees [*Marsupella adusta* (Nees) Spruce]
- 2 ***G. alpinum*** (Gottsche ex Husn.) Schiffn. [*Marsupella alpina* (Gottsche ex Husn.) Bernet]
- 3 ***G. brevissimum*** (Dumort.) Warnst. [*Marsupella brevissima* (Dumort.) Grolle]
- 4 ***G. commutatum*** (Limpr.) Schiffn. [*Marsupella commutata* (Limpr.) Bernet]
- 5 ***G. concinnatum*** (Lightf.) Corda
- 6 ***G. corallioides*** Nees
- 7 ***G. crenulatum*** Gottsche ex Carrington
- 8 ***G. obtusum*** Lindb.
- 9 ***G. revolutum*** (Nees) H.Philib. [*Apomarsupella revoluta* (Nees) R.M.Schust.]
  - a subsp. ***revolutum*** [56]

47 ***Marsupella*** Dumort.
- 1 ***M. andreaeoides*** (Lindb.) Müll.Frib.
- 2 ***M. apiculata*** Schiffn. [*Gymnomitrion apiculatum* (Schiffn.) Müll.Frib.]
- 3 ***M. aquatica*** (Lindenb.) Schiffn. [*Marsupella emarginata* subsp. *aquatica* (Lindenb.) Meyl., *Marsupella emarginata* var. *aquatica* (Lindenb.) Dumort.] [57]
- 4 ***M. arctica*** (Berggr.) Bryhn & Kaal.
- 5 ***M. boeckii*** (Austin) Lindb. ex Kaal.
- 6 ***M. condensata*** (Ångstr. ex C.Hartm.) Lindb. ex Kaal.
- 7 ***M. emarginata*** (Ehrh.) Dumort. [*Marsupella emarginata* var. *pearsonii* (Schiffn. ex Macvicar) Jørg.]
- 8 ***M. funckii*** (F.Weber & D.Mohr) Dumort. [*M. ramosa* Müll.Frib., *Marsupella funckii* var. *badensis* (Schiffn.) Fam.]
- 9 ***M. profunda*** Lindb.
- 10 ***M. sparsifolia*** (Lindb.) Dumort.
  - a subsp. ***sparsifolia*** [58]
- 11 ***M. sphacelata*** (Giesecke ex Lindenb.) Dumort.
- 12 ***M. spiniloba*** R.M.Schust. & Damsh.

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[55] *Endogemma* is feminine not neuter and the family name should therefore be Endogemmaceae, not Endogemmataceae as originally published.

[56] *Gymnomitrion revolutum* subsp. *novoguineanense* (R.M.Schust.) Váňa, Crand.-Stotl. & Stotler occurs in New Guinea.

[57] *Marsupella aquatica* was treated under *Marsupella emarginata* in Grolle and Long (2000) but shown to be sister to it and accepted at species level by Vilnet et al. (2010).

[58] *Marsupella sparsifolia* subsp. *childii* R.M.Schust. occurs in New Zealand.

13 ***M. sprucei*** (Limpr.) Bernet [*Marsupella sprucei* var. *neglecta* (Limpr.) Damsh., *Marsupella sprucei* var. *ustulata* (Limpr.) Damsh.]
14 ***M. stableri*** Spruce
15 ***M. subemarginata*** Bakalin & Fedosov [59]
16 ***M. tubulosa*** Steph. [*Marsupella emarginata* subsp. *tubulosa* (Steph.) N.Kitag.] [60]

48 ***Prasanthus*** Lindb.
1 ***P. suecicus*** (Gottsche) Lindb.

Nardioideae Váňa

49 ***Nardia*** Gray
1 ***N. breidleri*** (Limpr.) Lindb
2 ***N. compressa*** (Hook.) Gray
3 ***N. geoscyphus*** (De Not.) Lindb.
a var. ***bifida*** R.M.Schust. [61]
b var. ***geoscyphus*** [62]
c var. ***suberecta*** (Lindb. ex Kaal.) Váňa
4 ***N. insecta*** Lindb.
5 ***N. japonica*** Steph.
6 ***N. pacifica*** Bakalin [63]
7 ***N. scalaris*** Gray
a var. ***scalaris*** [64]

Harpanthaceae Arnell

50 ***Harpanthus*** Nees
1 ***H. flotovianus*** (Nees) Nees [*Harpanthus flotovianus* var. *chiloscyphoides* C.E.O.Jensen, *Harpanthus flotovianus* var. *latifolia* Jørg., *Harpanthus flotovianus* var. *retusa* Jørg.]
2 ***H. scutatus*** (F.Weber & D.Mohr) Spruce

Hygrobiellaceae Konstant. & Vilnet

51 ***Hygrobiella*** Spruce
1 ***H. laxifolia*** (Hook.) Spruce

Jungermanniaceae Rchb.
Delavayelloideae Grolle

52 ***Liochlaena*** Nees

[59] *Marsupella subemarginata* was described by Bakalin et al. (2019) from Kamchatka but also reported from Switzerland.
[60] *Marsupella tubulosa* was treated as a subspecies of *Marsupella emarginata* by Söderström et al. (2016) but shown to be better treated at species level by Bakalin et al. (2019).
[61] *Nardia geoscyphus* var. *bifida* was not recognised by Söderström et al. (2016) but we list it here pending better understanding of the variability of the species.
[62] *Nardia geoscyphus* var. *dioica* Bakalin occurs in E Asia.
[63] *Nardia pacifica* is a newly described species (Bakalin and Klimova 2016).
[64] *Nardia scalaris* var. *botryoidea* (R.M.Schust.) Váňa occurs in North America and var. *harae* (Amakawa) Váňa in E Asia.

1 ***L. lanceolata*** Nees [*Jungermannia lanceolata* auct. non L., *Jungermannia leiantha* Grolle, *Jungermannia subulata* var. *leiantha* (Grolle) Damsh.]
2 ***L. subulata*** (A.Evans) Schljakov [*Jungermannia subulata* A.Evans]

Jungermannioideae Dumort.

53 ***Eremonotus*** Lindb. & Kaal. ex Pearson
1 ***E. myriocarpus*** (Carrington) Lindb. & Kaal. ex Pearson

54 ***Jungermannia*** L.
1 ***J. atrovirens*** Dumort. [*Jungermannia lanceolata* L. *nom. rejic*., *Jungermannia lanceolata* var. *atrovirens* (Dumort.) Damsh.]
2 ***J. borealis*** Damsh. & Váňa
3 ***J. calcicola*** Konstant. & Vilnet [65]
4 ***J. eucordifolia*** Schljakov [*Jungermannia exsertifolia* subsp. *cordifolia* (Dumort.) Váňa] [66]
5 ***J. polaris*** Lindb. [*Jungermannia pumila* subsp. *polaris* (Lindb.) R.M.Schust.]
6 ***J. pumila*** With. [*Jungermannia pumila* var. *alpestris* Gottsche & Rabenh.]

Mesoptychioideae R.M.Schust.

55 ***Mesoptychia*** (Lindb.) A.Evans [*Leiocolea* (Müll.Frib.) Buch]
1 ***M. badensis*** (Gottsche ex Rabenh.) L.Söderstr. & Váňa [*Lophozia badensis* (Gottsche ex Rabenh.) Schiffn., *Leiocolea badensis* (Gottsche) Jørg., *Lophozia badensis* var. *obtusiloba* (Bernet) Schiffn.]
2 ***M. bantriensis*** (Hook.) L.Söderstr. & Váňa [*Lophozia bantriensis* (Hook.) Steph., *Leiocolea bantriensis* (Hook.) Jørg.]
a subsp. ***bantriensis*** [*Lophozia bantriensis* var. *subcompressa* (Limpr.) Damsh. ex L.Söderstr.]
b subsp. ***wallfischii*** (Ştefănuţ) L.Söderstr. & Váňa [*Leiocolea bantriensis* subsp. *wallfischii* Ştefănuţ] [67]
3 ***M. collaris*** (Nees) L.Söderstr. & Váňa [*Leiocolea collaris* (Nees) Schljakov, *Lophozia alpestris* (Schleich ex F.Weber) Evans *nom. rej.*, *Leiocolea alpestris* (Schleich. ex F.Weber) Isov., *Lophozia alpestris* var. *libertae* (Huebener) Damsh.]
4 ***M. fitzgeraldiae*** (Paton & A.R.Perry) L.Söderstr. & Váňa [*Leiocolea fitzgeraldiae* Paton & A.R.Perry]
5 ***M. gillmanii*** (Austin) L.Söderstr. & Váňa [*Lophozia gillmanii* (Austin) R.M.Schust., *Leiocolea gillmanii* (Austin) A.Evans, *Lophozia gillmanii* var. *acutifolia* (Limpr.) R.M.Schust.]
a var. ***gillmanii***

[65] *Jungermannia calcicola is* a newly described species from Russian Caucasus (Konstantinova and Vilnet 2016) and recently also recorded from Albania by Marka et al. (2018).
[66] *Jungermannia eucordifolia* was treated as a subspecies (*Jungermannia exsertifolia* subsp. *cordifolia*) in Söderström et al. (2016). However, Konstantinova and Vilnet (2016) and later Mamontov et al. (2018b) showed that it deserves specific status, as was proposed by Schljakov (1981) and followed by Russian bryologists (e.g. Konstantinova et al. 1992, 2009).
[67] *Mesoptychia bantriensis* subsp. *wallfischii* was described as *Leiocolea bantriensis* subsp. *wallfischii* by Ştefănuţ (2008) from Romania.

b var. ***laxa*** (Schiffn. ex Burrell) L.Söderstr. [*Leiocolea rutheana* var. *laxa* (Schiffn. ex Burrell) Paton, *Lophozia rutheana* var. *laxa* (Schiffn. ex Burrell) Paton ex Damsh. *nom. inval*.] [68]

6 ***M. heterocolpos*** (Thed. ex Hartm.) L.Söderstr. & Váňa [*Lophozia heterocolpos* (Thed. ex C.Hartm.) M.Howe, *Leiocolea heterocolpos* (Thed. ex Hartm.) H.Buch]

a var. ***arctica*** (S.W.Arnell) L.Söderstr. & Váňa [*Lophozia heterocolpos* var. *arctica* (S.W.Arnell) R.M.Schust. & Damsh.]

b var. ***harpanthoides*** (Bryhn & Kaal.) L.Söderstr. & Váňa [*Lophozia heterocolpos* var. *harpanthoides* (Bryhn & Kaal.) R.M.Schust.]

c var. ***heterocolpos***

7 ***M. rutheana*** (Limpr.) L.Söderstr. & Váňa [*Lophozia ruthana* (Limpr.) M.Howe, *Leiocolea rutheana* (Limpr.) Müll.Frib.]

8 ***M. sahlbergii*** (Lindb. & Arnell) A.Evans

9 ***M. turbinata*** (Raddi) L.Söderstr. & Váňa [*Leiocolea turbinata* (Raddi) H.Buch]

Saccogynaceae Heeg

56 ***Saccogyna*** Dumort.

1 ***S. viticulosa*** (L.) Dumort.

Solenostomataceae Stotler & Crand.-Stotl.

57 ***Cryptocolea*** R.M.Schust.

1 ***C. imbricata*** R.M.Schust.

58 ***Solenostoma*** Mitt. [*Plectocolea* (Mitt.) Mitt.]

subgenus *Eucalyx* (Lindb.) Váňa, Crand.-Stotl. & Stotler

1 ***S. obovatum*** (Nees) C.Massal. [*Jungermannia obovata* Nees, *Plectocolea obovata* (Nees) Lindb.,]

2 ***S. subellipticum*** (Lindb. ex Heeg) R.M.Schust. [*Jungermannia subelliptica* (Lindenb. ex Heeg) Levier, *Plectocolea subelliptica* (Lindb. ex Kaal.) A.Evans, *Jungermannia obovata* subsp. *minor* (Carrington) Damsh.] [69]

subgenus *Metasolenostoma* Váňa, Crand.-Stotl. & Stotler

3 ***S. gracillimum*** (Sm.) R.M.Schust. [*Jungermannia gracillima* Sm., *Jungermannia gracillima* var. *crenulata* (Mitt.) Damsh.]

4 ***S. handelii*** (Schiffn.) Müll.Frib. [*Jungermannia handelii* (Schiffn.) Amakawa]

subgenus *Plectocolea* Mitt.

5 ***S. callithrix*** (Lindenb. & Gottsche) Steph. [*Jungermannia callithrix* Lindenb. & Gottsche]

6 ***S. hyalinum*** (Lyell) Mitt. [*Jungermannia hyalina* Lyell, *Plectocolea hyalina* (Lyell) Mitt.]

7 ***S. paroicum*** (Schiffn.) R.M.Schust. [*Jungermannia paroica* (Schiffn.) Grolle]

subgenus *Solenostoma*

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[68] *Mesoptychia gillmanii* var. *laxa* was accepted by Söderström et al. (2016) as *Mesoptychia rutheana* var. *laxa* although with low confidence. However, the study by Bell et al. (2013) was largely overlooked and the relation to *Mesoptychia gillmanii* rather than to *Mesoptychia rutheana* was not acknowledged.

[69] *Solenostoma subellipticum* was nested in *Solenostoma obovatum* in Shaw et al. (2015) and thus reduced to a synonym, a treatment followed by Söderström et al. (2016). However, as it seems distinct in at least parts of its distribution area we list it here with some hesitation.

8 ***S. caucasicum*** (Váňa) Konstant. [70]
9 ***S. confertissimum*** (Nees) Schljakov [*Jungermannia confertissima* Nees]
10 ***S. sphaerocarpum*** (Hook.) Steph. [*Jungermannia sphaerocarpa* Hook., *Solenostoma pusillum* (C.E.O.Jens.) Steph., *Jungermannia jenseniana* Grolle, *Jungermannia sphaerocarpa* var. *nana* (Nees ex Flot.) Frye & L.Clark *nom. illeg*., *Solenostoma sphaerocarpum* var. *nanum* (Nees ex Flot.) R.M.Schust.]

Southbyaceae Váňa, Crand.-Stotl., Stotler & D.G.Long

59 ***Gongylanthus*** Nees
1 ***G. ericetorum*** (Raddi) Nees

60 ***Southbya*** Spruce
1 ***S. nigrella*** (De Not.) Henriq.
2 ***S. tophacea*** (Spruce) Spruce

Blepharostomataceae W.Frey & M.Stech

61 ***Blepharostoma*** (Dumort.) Dumort.
1 ***B. trichophyllum*** (L.) Dumort.
a subsp. ***brevirete*** (Bryhn & Kaal.) R.M.Schust. [*Blepharostoma trichophyllum* var. *brevirete* Bryhn & Kaal.]
b subsp. ***trichophyllum***

Herbertaceae Müll.Frib. ex Fulford & Hatcher

62 ***Herbertus*** Gray
1 ***H. azoricus*** (Steph.) P.W.Richards [71]
2 ***H. borealis*** Crundw. [*Herbertus delavayi* auct. eur. non (Steph.) Steph.]
3 ***H. hutchinsiae*** (Gottsche & Rabenh.) A.Evans [*Herbertus aduncus* auct. non (Dicks.) Gray, *Herbertus aduncus* subsp. *hutchinsiae* (Gottsche & Rabenh.) R.M.Schust. *nom. inval.*] [72]
4 ***H. norenus*** D.G.Long, D.Bell & H.H.Blom [73]
5 ***H. sendtneri*** (Nees) Lindb.
6 ***H. stramineus*** (Dumort.) Trevis.

Lepidoziaceae Limpr.

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[70] *Solenostoma caucasicum* was reported as new to Europe from the northern part of Caucasus by Konstantinova and Savchenko (2013).

[71] Only a single species of *Herbertus*, *Herbertus azoricus*, has to date been published from the Azores. However, Richards (1936) observed that there are two 'forms' present in the archipelago, and it is now clear that two species are present (Hodgetts and Rumsey in prep.), but further analysis is needed to characterize them. Feldberg *et al.* (2004) suggested that *Herbertus azoricus* should be placed in synonymy with *Herbertus sendtneri*. However, further studies show that spurious lumping of taxa in *Herbertus* gives a much too simplified view of this complex genus (F. Rumsey pers. comm. 2018), and *Herbertus sendtneri* is therefore best regarded as an exclusively Northern Hemisphere species, restricted to the Austrian Alps, Himalaya, and the Pacific Northwest of North America. Current indications are that *Herbertus azoricus* is best treated as a synonym or a subspecies of *Herbertus juniperoideus*, that *Herbertus sendtneri* does not occur in Macaronesia, and that this second Azorean species has affinities with South American taxa and plants from the Appalachians previously assigned to *H. tenuis.*

[72] Reports of *Herbertus aduncus* from Europe belong to *Herbertus hutchinsiae*, treated for a long time as a synonym or subspecies of *Herbertus aduncus*.

[73] *Herbertus norenus* was described from Norway and Scotland by Bell et al. (2012).

Version Today

Bazzanioideae Rodway

63 ***Bazzania*** Gray
- 1 ***B. azorica*** H.Buch & Perss.
- 2 ***B. flaccida*** (Dumort.) Grolle
- 3 ***B. pearsonii*** Steph.
- 4 ***B. tricrenata*** (Wahlenb.) Lindb.
  - a var. ***tricrenata*** [74]
- 5 ***B. trilobata*** (L.) Gray
  - a var. ***depauperata*** (Müll.Frib.) Grolle
  - b var. ***trilobata***

Lembidioideae R.M.Schust.

64 ***Kurzia*** G.Martens
- 1 ***K. pauciflora*** (Dicks.) Grolle
- 2 ***K. sylvatica*** (A.Evans) Grolle
- 3 ***K. trichoclados*** (Müll.Frib.) Grolle

Lepidozioideae Müll.Frib.

65 ***Lepidozia*** (Dumort.) Dumort.
- 1 ***L. cupressina*** (Sw.) Lindenb.
  - a subsp. ***cupressina*** [*Lepidozia cupressina* subsp. *pinnata* (Hook) Pócs, *Lepidozia cupressina* var. *dissitifolia* (Jørg.) Damsh.] [75]
- 2 ***L. pearsonii*** Spruce
- 3 ***L. reptans*** (L.) Dumort. [*Lepidozia reptans* var. *julacea* (Nees) Damsh. *nom. inval.*, *Lepidozia reptans* var. *tenera* (Huebener) P.Allorge *nom. inval.*]
- 4 ***L. stuhlmannii*** Steph. [76]

66 ***Tricholepidozia*** (R.M.Schust.) E.D.Cooper
- 1 ***T. lindenbergii*** (Gottsche) E.D.Cooper [77]
  - a var. ***lindenbergii*** [78]
- 2 ***T. tetradactyla*** (Hook.f. & Taylor) E.D.Cooper [*Telaranea longii* Paton, *Telaranea murphyae* Paton] [79]

Zoopsidoideae R.M.Schust.

67 ***Telaranea*** Spruce ex Schiffn.
- 1 ***T. azorica*** (H.Buch & Perss.) Pócs [*Lepidozia azorica* H.Buch & Perss.]

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[74] *Bazzania tricrenata* var. *fulfordiae* W.S.Hong occurs in North America.

[75] *Lepidozia cupressina* subsp. *africana* (Steph.) Pócs occurs in Africa and subsp. *natalensis* (Steph.) Pócs in southern Africa.

[76] *Lepidozia stuhlmannii* was reported new to the Azores by Frahm (2005). *Lepidozia stuhlmannii* subsp. *pulvinata* (Steph.) Pócs and var. *carnosa* (Steph.) Pócs occur in Africa. The subspecific identity of the plants in the Azores is unknown.

[77] *Tricholepidozia lindenbergii* was reported as new to Britain (and the Northern Hemisphere) by Blackstock et al. (2019).

[78] *Trichlepidozia lindenbergii* var. *complanata* (J.J.Engel & G.L.Merr.) E.D.Cooper, var. *mellea* (J.J.Engel & G.L.Merr.) E.D.Cooper and var. *papillata* (J.J.Engel & G.L.Merr.) E.D.Cooper, as well as var. *lindenbergii* occurs in New Zealand.

[79] *Tricholepidozia* was elevated to a separate genus by Cooper et al. (2013) and *Tricholepidozia tetradactyla* was shown to be the same as *Telaranea longii* (Engel and Smith Merrill 2004) and *Telaranea murphyae* (Villarreal et al. 2014) from Britain.

2 ***T. europaea*** J.J.Engel & G.L.Merr. [*Telaranea nematodes* auct. eur. non (Gottsche ex Austin) M.Howe]

Lophocoleaceae Vanden Berghen

68 ***Chiloscyphus*** Corda [80]
- 1 ***C. pallescens*** (Ehrh.) Dumort.
  - a var. ***fragilis*** (Roth) Müll.Frib.
  - b var. ***pallescens***
- 2 ***C. polyanthos*** (L.) Corda
  - a var. ***polyanthos***
  - b var. ***rivularis*** (Schrad.) Lindb. & Arnell

69 ***Heteroscyphus*** Schiffn.
- 1 ***H. denticulatus*** (Mitt.) Schiffn.
- 2 ***H. fissistipus*** (Hook.f. & Taylor) Schiffn. [81]

70 ***Leptoscyphus*** Mitt.

subgenus *Anomylia* (R.M.Schust.) R.M.Schust.
- 1 ***L. cuneifolius*** (Hook.) Mitt.

subgenus *Leptoscyphus*

section *Leptoscyphus*
- 2 ***L. porphyrius*** (Nees) Grolle
  - a subsp. ***azoricus*** (H.Buch & Perss.) Vanderp. & Heinrichs [*Leptoscyphus azoricus* (H.Buch & Perss.) Grolle] [82]

71 ***Lophocolea*** (Dumort.) Dumort.
- 1 ***L. bidentata*** (L.) Dumort. [*Lophocolea cuspidata* (Nees) Limpr., *Chiloscyphus latifolius* (Nees) J.J.Engel & R.M.Schust.] [83]
- 2 ***L. bispinosa*** (Hook.f. & Taylor) Gottsche, Lindenb. & Nees
- 3 ***L. brookwoodiana*** Paton & Sheahan [84]
- 4 ***L. coadunata*** (Sw.) Mont. [*Chiloscyphus coadunatus* (Sw.) J.J.Engel & R.M.Schust., *Lophocolea cuspidata* auct. non (Nees) Limpr.], *Lophocolea bidentata* var. *rivularis* (Raddi) Schiffn.]

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[80] The *Chiloscyphus polyanthos* complex has been treated in various ways in the past, without any recent solution. Some authors have treated it as one species (*Chiloscyphus polyanthos*) with two subspecies (subsp. *polyanthos* and *pallescens* (e.g. Smith 1990); others as four segregate species (*Chiloscyphus polyanthos, Chiloscyphus pallescens, Chiloscyphus fragilis* and *Chiloscyphus rivularis* (e.g. Konstantinova et al. 1992). Grolle and Long (2000) kept two species, but did not deal with any subspecific taxa. Söderström et al. (2002) kept two species but recognised four varieties (*Chiloscyphus polyanthos* var. *polyanthos* and var. *rivularis* and *Chiloscyphus pallescens* var. *pallescens* and var. *fragilis*). Konstantinova et al. (2009a) also used this concept as well as the World Checklist of Hornworts and Liverworts (Söderström et al. 2016). However, several recent publications do not recognise any varieties of the two species (e.g. Köckinger 2017). The distribution of the taxa recognised here is therefore not recorded consistently over the continent.

[81] *Heteroscyphus fissitipus* is a neophyte in Europe, introduced from Australia/New Zealand where it occurs in three varieties, var. *fissistipus,* var. *multispinus* (E.A.Hodgs. & Allison) J.J.Engel and var. *repandus* J.J.Engel var. *repandus* J.J.Engel. Which of these varieties occur in Europe is unknown.

[82] *Leptoscyphus porphyrius* subsp. *porphyrius* occurs in South America.

[83] The *Lophocolea bidentata* complex has been treated in various ways in the past, and there is also some nomenclatural confusion. Váňa and Engel (2013) clarify the concepts, not only for Europe but world-wide. As we follow the World Check List (Söderström et al. 2016), we here treat them in the genus *Lophocolea* as *Lophocolea bidentata* (autoicious) and *Lophocolea coadunata* (dioicious). Many earlier reports are confusing and the occurrences in some countries are still questioned.

[84] *Lophocolea brookwoodiana* was described from Britain by Paton and Sheahan (2006).

5 ***L. fragrans*** (Moris & De Not.) Gottsche, Lindenb. & Nees [*Chiloscyphus fragrans* (Moris & De Not.) J.J.Engel & R.M.Schust.]
a subsp. ***fragrans*** [85]
6 ***L. heterophylla*** (Schrad.) Dumort. [*Chiloscyphus profundus* (Nees) J.J.Engel & R.M.Schust.]
a subsp. ***heterophylla*** [86]
7 ***L. minor*** Nees [*Chiloscyphus minor* (Nees) J.J.Engel & R.M.Schust.]
8 ***L. semiteres*** (Lehm.) Mitt.
a var. ***semiteres*** [87]

Mastigophoraceae R.M.Schust.

72 ***Mastigophora*** Nees
1 ***M. woodsii*** (Hook.) Nees

Plagiochilaceae Müll.Frib.

73 ***Pedinophyllum*** Lindb. ex Nordst.
1 ***P. interruptum*** (Nees) Kaal.

74 ***Plagiochila*** (Dumort.) Dumort.
section *Arrectae* Carl
1 ***P. bifaria*** (Sw.) Lindenb.
a var. ***bifaria*** [88]
2 ***P. papillifolia*** Steph. [89]
3 ***P. punctata*** (Taylor) Taylor
4 ***P. retrorsa*** Gottsche
5 ***P. spinulosa*** (Dicks.) Dumort.
6 ***P. stricta*** Lindenb.
section *Fuscoluteae* Carl
7 ***P. heterophylla*** Lindenb.
a var. ***heterophylla*** [*Plagiochila atlantica* F.Rose] [90]
section *Glaucescentes* Carl
8 ***P. longispina*** Lindenb. & Gottsche
section *Plagiochila*
9 ***P. arctica*** Bryhn & Kaal. [*Plagiochila asplenioides* subsp. *arctica* (Bryhn & Kaal.) R.M.Schust.]
a var. ***arctica*** [?*Plagiochila asplenioides* var. *lobata* (Kaal.) Jørg.] [91]
10 ***P. asplenioides*** (L.) Dumort. [*Plagiochila major* (Nees) S.W.Arnell]
11 ***P. britannica*** Paton
12 ***P. porelloides*** (Torr. ex Nees) Lindenb. [*Plagiochila asplenioides* subsp. *porelloides* (Torrey ex Nees) R.M.Schust.] [92]

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[85] *Lophocolea fragrans* subsp. *cocosana* G.Dauphin, Gradst. & M.I.Morales occurs on Cocos Island.
[86] *Lophocolea heterophylla* subsp. *cladogyna* R.M.Schust. occurs in North America.
[87] *Lophocolea semiteres* var. *retusa* (J.J.Engel) L.Söderstr. occurs in Australia.
[88] *Plagiochila bifaria* var. *rosea* (R.M.Schust.) Heinrichs occurs in South America.
[89] The primarily neotropical *Plagiochila papillifolia* was reported as new from the Azores by Heinrichs et al. (2002b).
[90] *Plagiochila heterophylla* var. *beauverdii* (Steph.) Heinrichs occurs in South America.
[91] *Plagiochila arctica* var. *intermedia* R.M.Schust. occurs in North America. The synonymy of *Plagiochila asplenioides* var. *lobata* (Damsholt 2002) is problematic, as he states that *Plagiochila arctica* does not occur in Norway and the type of the synonymised variety is from the mountains in central Norway.

a var. ***norvegica*** (H.H.Blom & Holten) Schumacker & Váňa [*Plagiochila norvegica* H.H.Blom & Holten]
b var. ***porelloides*** [*Plagiochila asplenioides* var. *devexa* Carrington, *Plagiochila asplenioides* var. *minor* Lindenb., *Plagiochila asplenioides* var. *humilis* (Nees) Lindenb.]
c var. ***subarctica*** (Jørg.) Lammes [*Plagiochila asplenioides* var. *subarctica* Jørg.]

section *Poeltiae* Inoue

13 ***P. carringtonii*** (Balf. ex Carrington) Grolle
a subsp. ***carringtonii*** [93]

section *Rutilantes* Carl

14 ***P. exigua*** (Taylor) Taylor
15 ***P. maderensis*** Gottsche ex Steph. [94]

section *Vagae* Lindenb.

16 ***P. virginica*** A.Evans [*Plagiochila dubia* auct. eur. non Lindenb. & Gottsche (=*Plagiochila patula* (Sw.) Lindenb.)]
a var. ***virginica*** [95]

Trichocoleaceae Nakai

75 ***Trichocolea*** Dumort.
1 ***T. tomentella*** (Ehrh.) Dumort.

Myliaceae Schljakov

76 ***Mylia*** Gray
subgenus *Anomalae* (R.M.Schust. ex Potemkin) L. Söderstr.
1 ***M. anomala*** (Hook.) Gray
subgenus *Mylia*
2 ***M. taylorii*** (Hook.) Gray

Porellales Schljakov

Frullaniaceae Lorch

77 ***Frullania*** Raddi
subgenus *Frullania*
1 ***F. jackii*** Gottsche [*Frullania davurica* subsp. *jackii* (Gottsche) S.Hatt.]
2 ***F. riparia*** Hampe [*Frullania cesatiana* De Not.] [96]

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[92] *Plagiochila porelloides* is a variable species and many varieties have been described. Their value is questionable but the three included here have frequently been recognised in recent studies.

[93] *Plagiochila carringtonii* subsp. *lobuchensis* Grolle occurs in Himalaya.

[94] *Plagiochila maderensis* was placed in synonymy with *Plagiochila spinulosa* by Grolle (1967) but reinstated by Rycroft et al. (2004).

[95] *Plagiochila virginica* var. *caroliniana* R.M.Schust. and var. *euryphylla* R.M.Schust. occur in North America.

[96] In spite of being under discussion for over 30 years, the problem of the *Frullania riparia* (American) / *cesatiana* (European) / *muscicola* (Asiatic) complex has not yet been solved. As concluded in Bisang et al. (1989), if they are the same, the name *Frullania riparia* has priority. However, if the American populations are different from the European and Asiatic populations (as treated in Bisang et al. 1989), *Frullania cesatiana* would be the correct name (note that their 'combination' *Frullania cesatiana* var. *muscicola* (Steph.) Bisang et al. is a *nomen nudum*). Grolle (in Grolle and Long 2000) argue that the American *Frullania riparia* and European *Frullania cesatiana* are conspecific, but separate from the

section *Frullania*

3 ***F. azorica*** Sim-Sim, Sérgio, Mues & Kraut

4 ***F. dilatata*** (L.) Dumort.

a subsp. ***dilatata*** [97]

5 ***F. ericoides*** (Nees) Mont.

a var. ***ericoides*** [98]

6 ***F. fragilifolia*** (Taylor) Gottsche, Lindenb. & Nees

7 ***F. oakesiana*** Austin

a subsp. ***oakesiana*** [99]

8 ***F. parvistipula*** Steph.

subgenus *Thyopsiella*

9 ***F. acicularis*** Hentschel & von Konrat [*Frullania tamarisci* var. *azorica* J.-P.Frahm] [100]

10 ***F. calcarifera*** Steph. [101]

11 ***F. microphylla*** (Gottsche) Pearson [*Frullania microphylla* var. *deciduifolia* Grolle] [102]

12 ***F. polysticta*** Lindenb.

13 ***F. sergiae*** Sim-Sim, Fontinha, Mues & Lion

14 ***F. subarctica*** Vilnet, Borovich. & Bakalin [103]

15 ***F. tamarisci*** (L.) Dumort. [*Frullania tamarisci* var. *atrovirens* Carrington, *Frullania tamarisci* var. *cornubica* Carrington, *Frullania tamarisci* var. *ericetorum* Jørg., *Frullania tamarisci* var. *robusta* Lindb., *Frullania tamarisci* var. *sardoa* (De Not.) De Not.]

16 ***F. teneriffae*** (F.Weber) Nees

incertae sedis

17 ***F. bolanderi*** Austin

18 ***F. cleistostoma*** Schiffn. & W.Wollny [*Frullania inflata* auct. eur. non Gottsche] [104]

Jubulaceae H.Klinggr.

78 ***Jubula*** Dumort.

1 ***J. hutchinsiae*** (Hook.) Dumort. [105]

Asiatic *Frullania muscicola* Steph. For now we are following this concept pending further research, preferably including molecular data.

[97] *Frullania dilatata* subsp. *asiatica* S.Hatt. occurs in E Asia

[98] *Frullania ericoides* var. *laxa* (Gottsche, Lindenb. & Nees) Schiffn. occurs in SE Asia and Mexico, var. *minor* Kamim. in Japan and var. *verrucosa* (Kamim.) Hentschel & von Konrat in Japan.

[99] *Frullania oakesiana* subsp. *takayuensis* (Steph.) R.M.Schust. occurs in E Asia.

[100] *Frullania acicularis* was described from the Azores by Frahm (2006) as *Frullania tamarisci* var. *azorica* but shown to be separate from *Frullania tamarisci* by Heinrichs et al. (2010) and Vilnet et al. (2014) and elevated to species level by Hentschel et al. (2015)

[101] *Frullania calcarifera* was placed in synonymy of *Frullania tamarisci* by Hattori (1972) but shown to be a species separate from it by Heinrichs et al. (2010) and Vilnet et al. (2014)

[102] *Frullania microphylla* var. *deciduifolia* is not recognized by Sim-Sim (1999) as “all specimens from Portugal or Madeira have deciduous leaves”’, a treatment followed here as well as in the world checklist (Söderström et al. 2016).

[103] *Frullania subarctica* was described by Vilnet et al. (2014) from the Russian Far East but shown also to occur in northern Europe.

[104] *Frullania inflata* Gottsche as treated in Söderström et al. (2016) is a species complex. *Frullania inflata* s.str. is confined to North America and reports from Europe belongs to the segregate *Frullania cleistostoma* (Mamontov et al. 2018a).

a subsp. ***caucasica*** Konstant. & Vilnet [106]
b subsp. ***hutchinsiae***

Lejeuneaceae Cavers
Lejeuneoideae
trib. Brachiolejeuneeae
subtrib. Brachiolejeuneinae Gradst.

79 ***Acanthocoleus*** R.M.Schust.
1 ***A. aberrans*** (Lindenb. & Gottsche) Kruijt
a var. ***laevis*** Gradst. [107]

trib. Lejeuneeae Dumort.
subtrib. Cheilolejeuneinae Gradst.

80 ***Cheilolejeunea*** (Spruce) Steph.
subgenus *Euosmolejeunea* (Spruce) Kachroo
1 ***C. cedercreutzii*** (H.Buch & Perss.) Grolle

subtrib. Cololejeuneinae Gradst.

81 ***Cololejeunea*** (Spruce) Steph. [*Aphanolejeunea* A.Evans]
subgenus *Aphanolejeunea* (A.Evans) Pócs
1 ***C. madeirensis*** Schiffn. [*Aphanolejeunea madeirensis* (Schiffn.) Grolle]
2 ***C. microscopica*** (Taylor) Schiffn. [*Aphanolejeunea microscopica* (Taylor) A.Evans]
a var. ***microscopica*** [108]
3 ***C. sintenisii*** (Steph.) Pócs [*Aphanolejeunea sintenisii* Steph.]
subgenus *Cololejeunea*
4 ***C. calcarea*** (Lib.) Steph.
5 ***C. rossettiana*** (C.Massal.) Schiffn.
6 ***C. schaeferi*** Grolle
subgenus *Diaphanae* R.M.Schust.
7 ***C. azorica*** V.Allorge & Jovet-Ast [*Aphanolejeunea azorica* (V.Allorge & Ast) Bernecker & Pócs]

82 ***Lejeunea*** Lib.
subgenus *Lejeunea*
1 ***L. cavifolia*** (Ehrh.) Lindb.
2 ***L. eckloniana*** Lindenb. [*Lejeunea holtii* Spruce] [109]
3 ***L. flava*** (Sw.) Nees
a subsp. ***moorei*** (Lindb.) R.M.Schust. [110]

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[105] *Jubula hutchinsiae* is a complex species with many subspecies. In addition to the two subspecies occurring in Europe, five more are recognised in Söderström et al. (2016), subsp. *australiae* Pócs & A.Cairns (Australia), subsp. *bogotensis* (Steph.) Verd. (S and C America), subsp. *japonica* (Steph.) Horik. & Ando (E Asia), subsp. *javanica* (Steph.) Verd. (E and SE Asia) and subsp. *pennsylvanica* (Steph.) Verd. (North America).

106 *Jubula hutchinsiae* subsp. *caucasica* was described by Konstantinova and Vilnet (2011). Prior to the description, the subspecies occurring in the Caucasus was regarded as subsp. *javanica* (Steph.) Verd.

107 *Acanthocoleus aberrans* var. *aberrans* seems to be confined to South America.

[108] *Cololejeunea microscopica* var. *africana* (Pócs) Pócs & Bernecker and var. *exigua* (A.Evans) Pócs occur in Africa and South America.

[109] *Lejeunea holtii* was placed in synonymy with *Lejeunea eckloniana* by Dirkse et al. (1993). However, the two taxa differ slightly in morphology and a molecular study is needed to verify the synonymy.

4 ***L. hibernica*** Bischl., H.A.Mill. & Bonner ex Grolle
5 ***L. lamacerina*** (Steph.) Schiffn.
a subsp. ***lamacerina*** [111]
6 ***L. mandonii*** (Steph.) Müll.Frib.
7 ***L. patens*** Lindb.
subgenus *Nanolejeunea* R.M.Schust.
8 ***L. canariensis*** (Steph.) Steph. [*Lejeunea laetevirens* auct.] [112]

83 ***Colura*** (Dumort.) Dumort.
subgenus *Colura*
section *Colura*
1 ***C. calyptrifolia*** (Hook.) Dumort.

84 ***Myriocoleopsis*** Schiffn.
1 ***M. minutissima*** (Sm.) R.L.Zhu, Y.Yu & Pócs [*Cololejeunea minutissima* (Sm.) Schiffn.]
a subsp. ***minutissima*** [113]

subtrib. Drepanolejeuneinae Gradst.

85 ***Drepanolejeunea*** (Spruce) Steph.
subgenus *Drepanolejeunea*
1 ***D. hamatifolia*** (Hook.) Schiffn.

subtrib. Lejeuneinae Gradst.

86 ***Harpalejeunea*** (Spruce) Schiffn.
subgenus *Harpalejeunea*
1 ***H. molleri*** (Steph.) Grolle
a subsp. ***molleri*** [114]

87 ***Microlejeunea*** (Spruce) Steph.
1 ***M. ulicina*** (Taylor) Steph. [*Lejeunea ulicina* (Taylor) Gottsche, Lindenb. & Nees]

Ptychanthoideae Mizut.

88 ***Marchesinia*** Gray
subgenus *Marchesinia*
1 ***M. mackaii*** (Hook.) Gray

Porellaceae Cavers

89 ***Porella*** L.

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[110] *Lejeunea flava* subsp. *flava* is widespread in the tropics, subsp. *orientalis* R.M.Schust. occurs in E and SE Asia, subsp. *tabularis* (Spreng.) S.W.Arnell in Africa and var. *pellucida* Lindenb. & Gottsche in South America.

[111] *Lejeunea lamacerina* subsp. *gemminata* R.M.Schust. occurs in North America.

[112] *Lejeunea canariensis* from Madeira was nested within *Lejeunea laetevirens* in the study by Heinrichs et al. (2013). However, *Lejeunea laetevirens* seems to be a complex species with several other taxa also nested within it. We keep *Lejeunea canariensis* as a separate species for now, recognizing that it seems to be the only element of the *Lejeunea laetevirens* complex occurring in Macaronesia.

[113] *Myriocoleopsis minutissima* subsp. *myriocarpa* (Nees & Mont.) R.L.Zhu, Y.Yu & Pócs is widespread in the tropics.

[114] *Harpalejeunea molleri* subsp. *integra* (R.M.Schust.) Damsh. occurs in North America.

1 ***P. arboris-vitae*** (With.) Grolle
a subsp. ***arboris-vitae*** [*Porella arboris-vitae* var. *killarniensis* (Pearson) M.F.V.Corley, *Porella arboris-vitae* var. *obscura* (Nees) M.F.V.Corley] [115]
2 ***P. baueri*** (Schiffn.) C.E.O.Jensen
3 ***P. canariensis*** (F.Weber) Underw.
4 ***P. cordaeana*** (Huebener) Moore [*Porella cordaeana* var. *faeroensis* (C.E.O.Jensen) E.W.Jones, *Porella cordaeana* var. *simplicior* (J.E.Zetterst.) Arnell]
5 ***P. inaequalis*** (Gottsche) Perss.
6 ***P. obtusata*** (Taylor) Trevis.
7 ***P. pinnata*** L.
8 ***P. platyphylla*** (L.) Pfeiff. [*Porella platyphylla* var. *subsquarrosa* (Schiffn.) Arnell]

Radulaceae Müll.Frib.

90 ***Radula*** Dumort.
subgenus *Radula*
1 ***R. aquilegia*** (Hook.f. & Taylor) Gottsche, Lindenb. & Nees
2 ***R. carringtonii*** J.B.Jack
3 ***R. complanata*** (L.) Dumort. [*Radula complanata* var. *alpestris* (Lindb. ex Berggr.) Lindb.]
4 ***R. jonesii*** Bouman, Dirkse & K.Yamada
5 ***R. lindenbergiana*** Gottsche ex C.Hartm. [*Radula complanata* subsp. *lindenbergiana* (Gottsche ex C.Hartm.) R.M.Schust., *Radula lindbergiana* Gottsche ex J.B.Jack *nom. inval.*]
6 ***R. visianica*** C.Massal. [116]
7 ***R. wichurae*** Steph.
subgenus *Volutoradula* Devos, M.A.M.Renner, Gradst., A.J.Shaw & Vanderp.
8 ***R. holtii*** Spruce
9 ***R. nudicaulis*** Steph.
a var. ***delicatula*** P.Allorge & V.Allorge
b var. ***nudicaulis***
10 ***R. voluta*** Taylor

Ptilidiales Schljakov

Ptilidiaceae H.Klinggr.

91 ***Ptilidium*** Nees
1 ***P. ciliare*** (L.) Hampe
2 ***P. pulcherrimum*** (Weber) Vain. [*Ptilidium pulcherrimum* var. *subpinnatum* (Jørg.) Damsh.]

Metzgeriales Chalaud

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[115] *Porella arboris-vitae* subsp. *nitidula* (C.Massal.) S.Hatt. occurs in E Asia.

[116] *Radula visianica* was until recently only known from two collections in N. Italy, the type in 1878 and a later collection in the southern Alps in the 1930s, but was recently found in several localities in Austria (Köckinger 2016). It is shown to be well separated molecularly from other species in subgenus *Radula* (Váňa et al. 2017).

Aneuraceae H.Klinggr.

92 ***Aneura*** Dumort [*Cryptothallus* Malmb.] [117]
- 1 ***A. latissima*** Spruce [*Aneura pseudopinguis* (Herzog) Pócs] [118]
- 2 ***A. maxima*** (Schiffn.) Steph. [119]
- 3 ***A. mirabilis*** (Malmb.) Wickett & Goffinet [*Cryptothallus mirabilis* Malmb.]
- 4 ***A. pinguis*** (L.) Dumort. [*Aneura pinguis* var. *angustior* (Hook.) Dumort., *Aneura pinguis* var. *denticulata* (Nees) Godelin., *Aneura pinguis* var. *fuscovirens* (Lindb.) Damsh.]

93 ***Riccardia*** Gray [120]
- 1 ***R. chamedryfolia*** (With.) Grolle [*Riccardia chamedryfolia* var. *major* (Nees) R.M.Schust. *nom. illeg*., *Riccardia chamedryfolia* var. *submersa* (C.E.O.Jensen ex Müll.Frib.) Damsh. *nom. inval*.]
- 2 ***R. incurvata*** Lindb.
- 3 ***R. latifrons*** (Lindb.) Lindb.
  - a subsp. ***arctica*** R.M.Schust. & Damsh.
  - b subsp. ***latifrons*** [121]
- 4 ***R. multifida*** (L.) Gray
  - a subsp. ***multifida*** [122]
- 5 ***R. palmata*** (Hedw.) Carruth.

Metzgeriaceae H.Klinggr.

94 ***Metzgeria*** Raddi [Apometzgeria Kuwah.]
- 1 ***M. conjugata*** Lindb. [*Metzgeria conjugata* var. *alipila* Kaal., *Metzgeria conjugata* var. *macvicarii* Kaal.]
- 2 ***M. consanguinea*** Schiffn. [*Metzgeria temperata* auct. eur. non Kuwah.] [123]
- 3 ***M. furcata*** (L.) Corda [*Metzgeria furcata* var. *expansa* Douin, *Metzgeria furcata* var. *flexipilis* Kaal., *Metzgeria furcata* var. *ulvula* (Nees) Pavletic] [124]

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[117] The genus *Aneura* includes several genetically distinct lineages (cf. Bączkiewicz et al. 2017) and the European '*Aneura maxima*' is genetically different from the population on the type locality on Java (D.G.Long, pers. comm.). It is also unlikely that *Aneura latissima* (syn. *Aneura pseudopinguis*) from South America represents any of the European lineages. However, until the taxonomy is further clarified, the 'traditional' treatment is followed here, as it was in Söderström et al. (2016).

[118] *Aneura latissima* was reported (as *Aneura pseudopinguis*) new to Europe by Sérgio and Garcia (2009). The type of both names is from South America and it is unlikely that the European plants represent this taxon. It is more probable that they belong to some of the unpublished European lineages (Long et al. in prep.).

[119] *Aneura maxima* is a SE Asian taxon that is not conspecific with the taxon in Europe so named. The latter is at present lacking a valid name.

[120] *Riccardia* is classified into several subgenera and sections in Söderström et al. (2016). The European species all belong to subgenus *Riccardia*, and mostly also to section *Riccardia*, except for *R. incurvata*, the position of which is unclear.

[121] *Riccardia latifrons* var. *miyakeana* (Schiffn.) Furuki occurs in Japan.

[122] *Riccardia multifida* subsp. *decrescens* (Steph.) Furuki occurs in E Asia and subsp. *synoica* R.M.Schust. in SE USA.

[123] *Metzgeria temperata* was synonymised with the primarily pantropical *Metzgeria consanguinea* by Hill et al. (2008). However, unpublished molecular studies show that the European populations are closer to *Metzgeria violacea* than to the Japanese *Metzgeria temperata* (see Köckinger 2017). Until the position of the European *Metzgeria 'temperata'* is clarified, we use the name *Metzgeria consanguinea*, although with some hesitation.

[124] North American populations of *Metzgeria furcata* have recently been recognised as a separate species, *Metzgeria setigera* R.M.Schust. ex Crand.-Stotl. & L. Söderstr. (Söderström et al.

4 ***M. leptoneura*** Spruce [*Metzgeria hamata* auct. non Lindb.] [125]
a var. ***leptoneura*** [126]
5 ***M. pubescens*** (Schrank) Raddi [*Apometzgeria pubescens* (Schrank) Kuwah.]
6 ***M. simplex*** Lorb. ex Müll.Frib. [*Metzgeria conjugata* subsp. *simplex* (Lorb. ex Müll.Frib.) R.M.Schust.]
7 ***M. violacea*** (Ach.) Dumort. [*Metzgeria fruticulosa* auct. non (O.F.Müll.) A.Evans] [127]

Pleuroziales Schljakov

Pleuroziaceae Müll.Frib.

95 ***Pleurozia*** Dumort.
subgenus *Constantifolia* B.M.Thiers
1 ***P. purpurea*** Lindb.

Fossombroniales Schljakov

Calyculariaceae He-Nygrén, Juslén, Ahonen, Glenny & Piippo

96 ***Calycularia*** Mitt.
1 ***C. laxa*** Lindb. & Arnell [128]

Fossombroniaceae Hazsl.

97 ***Fossombronia*** Raddi
1 ***F. angulosa*** (Dicks.) Raddi
2 ***F. caespitiformis*** (Raddi) De Not. ex Rabenh.
a subsp. ***caespitiformis***
b subsp. ***multispira*** (Schiffn.) J.R.Bray & Cargill [*Fossombronia husnotii* Corb.]
3 ***F. crispa*** Nees [*Fossombronia zeyheri* Steph.] [129]
4 ***F. echinata*** Macvicar
5 ***F. fimbriata*** Paton
6 ***F. fleischeri*** Osterwald ex Loeske [130]

2015).*Metzgeria furcata* var. *pacifica* Brinkm. occurs in E North America, and probably belongs to *Metzgeria setigera*. *Metzgeria furcata* var. *expansa* was recognised in Söderström et al. (2016), although with low confidence. It is known only from the type specimen in France and we do not recognise it here, as there are several other equally doubtful 'varieties' that could also be included. The whole *Metzgeria furcata* complex needs further study in Europe (and elsewhere).

[125] *Metzgeria hamata* Lindb. is technically a synonym of *Metzgeria procera* Mitt., but identical to *Metzgeria leptoneura* in the sense of Lindberg (1877) and all subsequent authors.

[126] *Metzgeria leptoneura* var. *breviseta* (Schiffn.) O.Yano occurs in Brazil and var. *polychaeta* R.M.Schust. in SE USA.

[127] Grolle and So (2003) demonstrated that the name *Metzgeria fruticulosa* technically belongs to *Riccardia palmata* and that *Metzgeria violacea* is the name that should be used.

[128] *Calycularia laxa* was reported new to European Russia from Nenets (Konstantinova & Lavrinenko 2002) and Murmansk (Sofronova et al. 2013) provinces.

[129] *Fossombronia crispa* was first reported from Portugal by Sérgio (1985) but Perold (1997) showed that her concept of the species was wrong. Later, Sérgio (2003) referred the plants to *Fossombronia leucoxantha*. However, Sérgio (1985) also reported *Fossombronia zeyheri*, which Perold (1997) showed was a synonym of *Fossombronia crispa* but Grolle and Long (2000) treated it as a synonym of *Fossombronia foveolata*.

7 ***F. foveolata*** Lindb.
8 ***F. incurva*** Lindb.
9 ***F. leucoxantha*** (Lehm.) Lehm. & Lindenb. [131]
10 ***F. maritima*** (Paton) Paton
11 ***F. mittenii*** Tind. (*Fossombronia crozalsii* Corb.)
12 ***F. pusilla*** (L.) Nees
13 ***F. wondraczekii*** (Corda) Dumort. ex Lindb.

Petalophyllaceae Stotler & Crand.-Stotl.

98 ***Petalophyllum*** Nees & Gottsche
1 ***P. ralfsii*** (Wilson) Nees & Gottsche

Moerckiaceae K.I.Goebel ex Stotler & Crand.-Stotl.

99 ***Moerckia*** Gottsche
1 ***M. blyttii*** (Mørch) Brockm.
2 ***M. flotoviana*** (Nees) Schiffn. [132]
3 ***M. hibernica*** (Hook.) Gottsche

Pallaviciniales W.Frey & M.Stech

Pallaviciniaceae Mig.
Pallavicinioideae Mig. ex Grolle

100 ***Pallavicinia*** Gray
1 ***P. lyellii*** (Hook.) Gray

Pelliales He-Nygrén

Pelliaceae H.Klinggr.

101 ***Apopellia*** (Grolle) Nebel & D.Quandt
1 ***A. endiviifolia*** (Dicks.) Nebel & D.Quand [*Pellia endiviifolia* (Dicks.) Dumort.]

102 ***Pellia*** Raddi
1 ***P. epiphylla*** (L.) Corda
a subsp. ***borealis*** (Lorb.) Messe
b subsp. ***epiphylla***
2 ***P. neesiana*** (Gottsche) Limpr.

MARCHANTIOPSIDA

Blasiales Stotler & Crand.-Stotl.

Blasiaceae H.Klinggr.

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[130] *Fossombronia fleischeri* has long been considered a synonym of *Fossombronia incurva*, but Stotler et al. (2003) showed that they should be regarded as distinct species.

[131] *Fossombronia leucoxantha* was reported from Portugal by Sérgio (1985) as *Fossombronia crispa* but Perold (1997) pointed out that her concept of *Fossombronia crispa* was wrong. Sérgio (2003) later referred the plants to *Fossombronia leucoxantha*.

[132] *Moerckia flotoviana* was synonymised with *Moerckia hibernica* by De Sloover (1959) and subsequently usually treated as such in the European literature. However, Crandall-Stotler and Stotler (2007) showed that they are distinct taxa. Thus, many reports of *Moerckia hibernica* belong to *Moerckia flotoviana*.

103 ***Blasia*** L.
1 ***B. pusilla*** L.

Lunulariales H.Klinggr.

Lunulariaceae H.Klinggr.

104 ***Lunularia*** Adans.
1 ***L. cruciata*** (L.) Dumort. ex Lindb.
a subsp. ***cruciata*** [133]

Marchantiales Limpr.

Aytoniaceae Cavers

105 ***Asterella*** P.Beauv.
subgenus *Asterella*
section *Brachyblepharis* (Nees) D.G.Long
1 ***A. africana*** (Mont.) Underw. ex A.Evans
subgenus *Phragmoblepharis* Grolle
2 ***A. lindenbergiana*** (Corda ex Nees) Lindb. ex Arnell
subgenus *Saccatae* (Grolle) D.G.Long
3 ***A. saccata*** (Wahlenb.) A.Evans

106 ***Mannia*** Corda
subgenus *Mannia*
1 ***M. androgyna*** (L.) A.Evans
2 ***M. californica*** (Gottsche) L.C.Wheeler [134]
3 ***M. controversa*** (Meyl.) D.B.Schill [135]
a subsp. ***controversa*** [136]
4 ***M. fragrans*** (Balb.) Frye & L.Clark
a subsp. ***fragrans*** [*Mannia fragrans* var. *brevipes* (Kaal.) Damsh.] [137]
5 ***M. sibirica*** (Müll.Frib.) Frye & L.Clark
subgenus *Neesiella*
6 ***M. gracilis*** (F.Weber) D.B.Schill & D.G.Long [*Asterella gracilis* [F.Weber) Underw.]
7 ***M. pilosa*** (Hornem.) Frye & L.Clark
8 ***M. triandra*** (Scop.) Grolle

107 ***Plagiochasma*** Lehm.
subgenus *Micropylum*
1 ***P. rupestre*** (J.R.Forst. & G.Forst.) Steph.
a var. ***rupestre*** [138]
subgenus *Plagiochasma*
2 ***P. appendiculatum*** Lehm. & Lindenb. [139]

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[133] *Lunularia cruciata* subsp. *thaxteri* (A.Evans & Herzog) R.M.Schust. occurs in South America and New Zealand.
[134] *Mannia californica* was reported new to Europe by Hugonnot and Schill (2006).
[135] *Mannia controversa* (type from Switzerland) was usually regarded as a synonym of *Mannia fragrans* until Schill et al. (2008) showed it to be an independent species.
[136] *Mannia controversa* subsp. *asiatica* D.B.Schill & D.G.Long occurs in Asia.
[137] *Mannia fragrans* subsp. *orientalis* R.M.Schust. occurs in Japan.
[138] *Plagiochasma rupestre* var. *volkii* Bischl. occurs in South America and southern Africa.

108 ***Reboulia*** Raddi
- 1 ***R. hemisphaerica*** (L.) Raddi
  - a subsp. ***australis*** R.M.Schust.
  - b subsp. ***dioica*** R.M.Schust.
  - c subsp. ***hemisphaerica*** [140]

Cleveaceae Cavers

109 ***Clevea*** Lindb.
- 1 ***C. hyalina*** (Sommerf.) Lindb. [*Athalamia hyalina* (Sommerf.) S.Hatt., *Clevea hyalina* var. *suecica* (Lindb.) Lindb., *Athalamia hyalina* var. *suecica* (Lindb.) S. Hatt., *Clevea hyalina* var. *rufescens* (S.W.Arnell) Konstant. *nom. inval.*]
- 2 ***C. spathysii*** (Lindenb.) Müll.Frib. [*Athalamia spathysii* (Lindenb.) S.Hatt.]

110 ***Peltolepis*** Lindb.
- 1 ***P. quadrata*** (Saut.) Müll.Frib.

111 ***Sauteria*** Nees
Section *Sauteria*
- 1 ***S. alpina*** (Nees) Nees

Conocephalaceae Müll.Frib. ex Grolle

112 Conocephalum Hill
- 1 ***C. conicum*** (L.) Dumort.
- 2 ***C. salebrosum*** Szweyk., Buczk. & Odrzyk. [141]

Corsiniaceae Engl.
Corsinioideae Schiffn.

113 ***Corsinia*** Raddi
- 1 ***C. coriandrina*** (Spreng.) Lindb.

Cyathodiaceae Stotler & Crand.-Stotl.

114 ***Cyathodium*** Kunze
- 1 ***C. foetidissimum*** Schiffn. [142]

Dumortieraceae D.G.Long

115 ***Dumortiera*** Nees
- 1 ***D. hirsuta*** (Sw.) Nees
  - a subsp. ***hirsuta*** [143]

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[139] *Plagiochasma appendiculatum* was reported new to Europe from the Baleares by Cros et al. (2005).

[140] *Reboulia hemispherica* subsp. *paradoxa* R.M.Schust. is described from Portugal (Schuster 1992b) but invalidly as it lacks a Latin description. If recognised it needs to be validated, but there are many uncertainties about the segregates of *Reboulia hemispherica. Reboulia hemispherica* subsp. *acrogyna* (R.M.Schust.) R.M.Schust. occurs in North America, subsp. *orientalis* R.M.Schust. in Asia, var. *fissisquama* Herzog in China and var. *turkestanica* C.E.O.Jensen ex Herzog in China.

[141] *Conocephalum salebrosum* was described by Szweykowski et al. (2005) from Poland but shown to have a wide distribution both in Europe and elsewhere in the northern Hemisphere. On the other hand, they showed that *Conocephalum conicum* was a near-endemic to Europe.

[142] *Cyathodium foetidissimum* was recorded new to Europe by Ligrone and Duckett (2005).

[143] *Dumortiera hirsuta* subsp. *nepalensis* (Taylor) R.M.Schust. is widespread in the tropics and subsp. *tatunoi* Horik. occurs in Japan.

Exormothecaceae Müll.Frib. ex Grolle

116 ***Exormotheca*** Mitt.
subgenus *Corbierella* (Douin & Trab.) Schiffn.
1 ***E. welwitschii*** Steph.
subgenus *Exormotheca*
2 ***E. pustulosa*** Mitt.

Marchantiaceae Lindl.
Marchantioideae Schiffn.

117 ***Marchantia*** L.
subgenus *Chlamidium* (Corda) Bischl.
section *Paleacea* Bischl.
1 ***M. paleacea*** Bertol.
a subsp. ***paleacea*** [144]
subgenus *Marchantia*
2 ***M. polymorpha*** L. [145]
a subsp. ***montivagans*** Bischl. & Boissel.-Dub. [*Marchantia alpestris* (Nees) Burgeff]
b subsp. ***polymorpha*** [*Marchantia aquatica* (Nees) Burgeff]
c subsp. ***ruderalis*** Bischl. & Boissel.-Dub. [*Marchantia latifolia* Gray]
subgenus *Preissia* (Corda) D.G.Long, Crand.-Stotl., L.L.Forrest & Villarreal [*Bucegia* Radian, *Preissia* Corda]
3 ***M. quadrata*** Scop. [*Preissia quadrata* (Scop.) Nees]
a subsp. ***hyperborea*** (R.M.Schust.) Borovich. [*Preissia quadrata* subsp. *hyperborea* R.M.Schust.]
b subsp. ***quadrata***
4 ***M. romanica*** (Radian) D.G.Long, Crand.-Stotl., L.L.Forrest & J.C.Villarreal [*Bucegia romanica* Radian]

Oxymitraceae Müll.Frib. ex Grolle

118 ***Oxymitra*** Bisch. ex Lindenb.
1 ***O. incrassata*** (Brot.) Sérgio & Sim-Sim

Ricciaceae Rchb.

119 ***Riccia*** L.
subgenus *Riccia*
section *Riccia* [146]
1 ***R. atlantica*** Sérgio & Perold
2 ***R. atromarginata*** Levier

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[144] *Marchantia paleacea* subsp. *diptera* (Nees & Mont.) Inoue occurs in E Asia.

[145] Recent molecular studies (Cronberg et al., unpubl.) indicate that the subspecies of *Marchantia polymorpha* should be better treated at species level. However, we keep them as subspecies until nomenclatural uncertainties raised by elevating them to species are resolved.

[146] As noted by Hugonnot (2010a), the nomenclature and taxonomy of many species in sect. *Riccia* is highly problematic. Difficult taxa include *Riccia bicarinata*, *R. bifurca*, *R. ciliata*, *R. crozalsii*, *R. michelii*, *R. subbifurca*, *R. warnstorfii* and the little-known *R. ligula*. The morphology of these taxa is plastic, and it is unclear to what extent the size of the thallus and the development and structure of cilia are determined by genetic or environmental factors. Jovet-Ast (1986) published an important monograph of the Mediterranean species, but her concepts have been questioned in recent years (e.g. Hugonnot, 2010b, 2015). Integrated molecular and morphological studies are urgently needed.

a var. ***atromarginata*** [147]

3 ***R. beyrichiana*** Hampe [*Riccia marginata* Lindb.]

4 ***R. bicarinata*** Lindb.

5 ***R. bifurca*** Hoffm. [*Riccia bifurca* var. *subinermis* Heeg]

6 ***R. breidleri*** Jur. ex Steph.

7 ***R. ciliata*** Hoffm. [*Riccia ciliata* var. *epilosa* Warnst., *Riccia ciliata* var. *intumescens* Bisch., *Riccia ciliata* var. *violacea* Kny, *Riccia dalslandica* S.W.Arnell, *Riccia intumescens* (Bisch.) Underw., *Riccia canescens* Steph., *Riccia trichocarpa* M.Howe., *Riccia crinita* auct. eur.] [148]

8 ***R. ciliifera*** Link [*Riccia melitensis* C.Massal.]

9 ***R. crozalsii*** Levier

10 ***R. crustata*** Trab.

11 ***R. glauca*** L. [*Riccia glauca* var. *major* (Roth) Lindenb.]

a var. ***ciliaris*** Warnst. [*Riccia glauca* var. *subinermis* (Lindb.) Warnst.]

b var. ***glauca***

12 ***R. gothica*** Damsh. & Hallingb.

13 ***R. gougetiana*** Durieu & Mont.

a var. ***armatissima*** Levier ex Müll.Frib.

b var. ***gougetiana***

14 ***R. lamellosa*** Raddi

15 ***R. ligula*** Steph.

16 ***R. macrocarpa*** Levier

17 ***R. michelii*** Raddi

18 ***R. nigrella*** DC.

19 ***R. papillosa*** Moris

20 ***R. sommieri*** Levier

21 ***R. sorocarpa*** Bisch.

a subsp. ***arctica*** R.M.Schust. ex Köckinger & L. Söderstr. [=*Riccia sorocarpa* subsp. *arctica* R.M.Schust. *nom. inval*., *Riccia lindenbergiana* Saut.]

b subsp. ***erythrophora*** R.M.Schust. ex Konstant. & L.Söderstr. [*Riccia sorocarpa* subsp. *erythrophora* R.M.Schust. *nom. inval*.]

c subsp. ***sorocarpa*** [149]

22 ***R. subbifurca*** Warnst. ex Croz.[150]

23 ***R. trabutiana*** Steph.

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[147] *Riccia atromarginata* var. *jovet-astiae* Rauh & Buchloh occurs on the Arabian Peninsula and adjacent parts of Africa.

[148] *Riccia trichocarpa* was synonymised with the Australian *Riccia crinita* (the latter having priority) by Jovet-Ast (2000), a synonymisation that has been largely overlooked or rejected by European bryologists. Hugonnot (2010b) argued that Jovet-Ast's (1986) concept of *Riccia trichocarpa* is actually *Riccia ciliata*, and her *Riccia ciliata* belongs to other species. Thus Hugonnot synonymised both taxa under the oldest name, *Riccia ciliata.*

[149] *Riccia sorocarpa* var *heegii* was accepted with low confidence in the world checklist of liverworts (Söderström et al. 2016). In Europe it has been reported from Portugal, Spain, France, Corsica, Sardinia, Austria, Serbia, North Macedonia and Romania as well as from the Canary Islands and Madeira.

[150] The name *Riccia subbifurca* has been used for different plants in Europe, and the application of the name is problematic, as is its relationship with other taxa such as *R. oelandica* C.E.O. Jensen. The species was described by Crozals (1903), based primarily on material from a serpentine site in France. It is discussed by Hugonnot (2018), who suggests that it could be a taxon of localised occurrence on serpentine.

24 ***R. warnstorfii*** Limpr. ex Warnst. [*Riccia warnstorfii* var. *commutata* (J.B.Jack ex Levier) Damsh., *Riccia warnstorfii* var. *subinermis* Warnst., *Riccia warnstorfii* var. *ciliaris* Warnst.]

section *Pilifer* O.H.Volk

25 ***R. boumanii*** Dirkse, Losada-Lima & M.Stech [151]

subgenus *Ricciella* (A.Braun) Boulay

section *Ricciella* (A.Braun) Bisch.

26 ***R. canaliculata*** Hoffm.

27 ***R. duplex*** Lorb. ex Müll.Frib.

a var. ***duplex*** [152]

28 ***R. fluitans*** L.

29 ***R. frostii*** Austin

a var. ***frostii*** [153]

30 ***R. huebeneriana*** Lindenb.

a subsp. ***huebeneriana*** [*Riccia huebeneriana* var. *pseudo-frostii* Schiffn.] [154]

31 ***R. perennis*** Steph.

32 ***R. rhenana*** Lorb. ex Müll.Frib.

a var. ***rhenana***

b var. ***violacea*** M.F.Boiko

section *Spongodes* Nees

33 ***R. cavernosa*** Hoffm. [*Riccia teneriffae* S.W.Arnell, *Riccia cavernosa* var. *angustior* (Nees) Damsh.]

34 ***R. crystallina*** L.

120 ***Ricciocarpos*** Corda

1 ***R. natans*** (L.) Corda

Targioniaceae Dumort.

121 Targionia L.

subgenus *Targionia*

1 ***T. hypophylla*** L.

a subsp. ***hypophylla*** [155]

2 ***T. lorbeeriana*** Müll.Frib.

Sphaerocarpales Cavers

Riellaceae Engl.

122 ***Riella*** Mont.

subgenus *Riella*

1 ***R. battandieri*** Trab.

2 ***R. bialata*** Trab. [156]

3 ***R. gallica*** Balansa ex Trab.

4 ***R. helicophylla*** (Bory & Mont.) Mont.

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[151] *Riccia boumanii* is newly described from the Canary Islands by Dirkse et al. (2016).

[152] *Riccia duplex* var. *megaspora* Na-Thalang occurs in Australia.

[153] *Riccia frostii* var. *crystallinoides* Schiffn. occurs in W Asia.

[154] *Riccia huebeneriana* subsp. *sullivantii* (Austin) R.M.Schust. occurs in North America.

[155] *Targionia hypophylla* subsp. *linealis* W.Frey & Kürschner occurs on the Arabian peninsula.

[156] *Riella bialata* was reported new to Europe from Spain by Puche and Segarra-Moragues (2013).

a var. ***helicophylla***
b var. ***macrocarpa*** P.Allorge
5 ***R. notarisii*** (Mont.) Mont. [157]
6 ***R. reuteri*** Mont.
subgenus *Trabutiella* Porsild
7 ***R. affinis*** M.Howe & Underw.
8 ***R. cossoniana*** Trab.
9 ***R. echinata*** (Müll.Frib.) Segarra, Puche & Sabovlj. [158]
10 ***R. mediterranea*** Segarra, Puche, Sabovlj., M.Infante & Heras [159]

Sphaerocarpaceae Heeg.

123 ***Sphaerocarpos*** Boehm.
subgenus *Austrosphaerocarpos* R.M.Schust.
1 ***S. stipitatus*** Bisch. ex Lindenb.
subgenus *Sphaerocarpos*
2 ***S. europaeus*** Lorb. [*Sphaerocarpos texanus* auct. eur. non Austin] [160]
3 ***S. michelii*** Bellardi

Mosses

BRYOPHYTA

SPHAGNOPSIDA

Sphagnales Limpr.

Sphagnaceae Dumort.

1 ***Sphagnum*** L. [161]
Subgenus *Rigida* (Lindb.) A.Eddy
1 ***S. compactum*** Lam. & DC.
2 ***S. strictum*** Sull.
Subgenus *Sphagnum*
3 ***S. affine*** Renauld & Cardot [*Sphagnum affine* var. *flagellare* (Schlieph. ex Röll) L.Söderstr. & Hedenäs, *Sphagnum imbricatum* subsp. *affine* (Renauld & Cardot) Flatberg]
4 ***S. austinii*** Sull. [*Sphagnum imbricatum* subsp. *austinii* (Sull.) Flatberg]
5 ***S. centrale*** C.E.O.Jensen [*Sphagnum palustre* var. *centrale* (C.E.O.Jensen) A.Eddy]

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[157] *Riella notarisii* is a species complex with poorly defined taxonomic boundaries including the European *Riella battandieri*, *Riella gallica* and *Riella reuteri* as well as *Riella cyrenaica* and *Riella sersuensis* from North Africa.

[158] *Riella echinata* is a new species described from North Africa by Segarra-Moragues et al. (2014) but also occurring in Spain, The Baleares and Canary Islands.

[159] *Riella mediterranea* is a new species described from Spain by Segarra-Moragues et al. (2014) but also occurring in the Baleares, Malta and Cyprus as well as in Morocco.

[160] European accessions of '*Sphaerocarpos texanus*' were shown to be clearly distinct from the American *Sphaerocarpos texanus* (Bell et al. 2013) and the latter is thus excluded from Europe. *Sphaerocarpos europaeus* is the oldest name based on a European specimen.

[161] The subgeneric and sectional classification of *Sphagnum* follows Laine et al. (2018).

6 ***S. divinum*** Flatberg & Hassel (*Sphagnum magellanicum* auct. eur. p.p., non Brid.] [162]
7 ***S. medium*** Limpr. (*Sphagnum magellanicum* auct. eur. p.p., non Brid.][2]
8 ***S. palustre*** L.
9 ***S. papillosum*** Lindb.

Subgenus *Acutifolia* (Russow) A.J.Shaw
section *Squarrosa* (Russow) Schimp.
10 ***S. mirum*** Flatberg & Thingsgaard [163]
11 ***S. squarrosum*** Crome
12 ***S. teres*** (Schimp.) Ångstr.
13 ***S. tundrae*** Flatberg
section *Polyclada* (C.E.O.Jensen) Horrell
14 ***S. wulfianum*** Girg.
section *Insulosa* Isov.
15 ***S. aongstroemii*** C.Hartm.
section *Acutifolia* Wilson
16 ***S. angermanicum*** Melin
17 ***S. arcticum*** Flatberg & Frisvoll
18 ***S. beothuk*** R.E.Andrus [164]
19 ***S. capillifolium*** (Ehrh.) Hedw. [*Sphagnum capillifolium* subsp. *capillifolium*]
20 ***S. concinnum*** (Berggr.) Flatberg [*Sphagnum fimbriatum* subsp. *concinnum* (Berggr.) Flatberg & Frisvoll] [165]
21 ***S. fimbriatum*** Wilson
22 ***S. fuscum*** (Schimp.) H.Klinggr.
23 ***S. girgensohnii*** Russow
24 ***S. molle*** Sull.
25 ***S. nitidulum*** Warnst. [166]
26 ***S. olafii*** Flatberg
27 ***S. quinquefarium*** (Braithw.) Warnst.
28 ***S. rubellum*** Wilson [*Sphagnum capillifolium* subsp. *rubellum* (Wilson) M.O.Hill]
29 ***S. rubiginosum*** Flatberg
30 ***S. russowii*** Warnst.
31 ***S. skyense*** Flatberg
32 ***S. subfulvum*** Sjörs
   a subsp. ***purpureum*** Flatberg
   b subsp. ***subfulvum***
33 ***S. subnitens*** Russow & Warnst.
   a subsp***. ferrugineum*** Flatberg [*Sphagnum subnitens* var. *ferrugineum* (Flatberg) M.O.Hill]

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[162] All European records of *Sphagnum magellanicum* are referable to *Sphagnum divinum* or *Sphagnum medium* (Hassel et al. 2018). *Sphagnum magellanicum* s.str. is confined to southern South America.
[163] *Sphagnum mirum* is an Arctic species recently found in Nenets Province, European Russia (Laine et al. 2018).
[164] *Sphagnum beothuk* is a North American species (Andrus 2006), recently found to occur in oceanic parts of Europe (Kyrkjeeide et al. 2015).
[165] Shaw et al. (2012) showed that *Sphagnum concinnum* and *Sphagnum fimbriatum* are distinct species on both morphological and molecular evidence.
[166] *Sphagnum nitidulum* is a doubtful species in need of revision that grows around fumaroles on the island of Terceira in the Azores.It appears distinctive, but the diagnostic characters might merely be the result of these extreme conditions (Séneca & Söderström 2009).

b subsp. ***subnitens***
34 ***S. tescorum*** Flatberg [167]
35 ***S. venustum*** Flatberg [168]
36 ***S. warnstorfii*** Russow
section *Subsecunda* (Lindb.) Schimp.
37 ***S. auriculatum*** Schimp. [*Sphagnum denticulatum* Brid.]
38 ***S. contortum*** Schultz
39 ***S. inundatum*** Russow
40 ***S. platyphyllum*** (Lindb. ex Braithw.) Warnst.
41 ***S. pylaesii*** Brid.
42 ***S. subsecundum*** Nees
section *Cuspidata* Lindb.
43 ***S. angustifolium*** (C.E.O.Jensen ex Russow) C.E.O.Jensen
44 ***S. annulatum*** H.Lindb. ex Warnst.
45 ***S. balticum*** (Russow) C.E.O.Jensen
46 ***S. cuspidatum*** Ehrh. ex Hoffm.
a var. ***cuspidatum***
b var. ***viride*** (Flatberg) Lönnell & Hassel [*Sphagnum viride* Flatberg] [169]
47 ***S. fallax*** (H.Klinggr.) H.Klinggr. [170]
a var. ***brevifolium*** (Lindb. ex Braithw.) Lönnell & Hassel [*Sphagnum brevifolium* (Lindb. ex Braithw.) Röll]
b var. ***fallax***
c var. ***isoviitae*** (Flatberg) Lönnell & Hassel [*Sphagnum fallax* subsp. *isoviitae* (Flatberg) M.O.Hill, *Sphagnum isoviitae* Flatberg]
48 ***S. flexuosum*** Dozy & Molk.
49 ***S. jensenii*** H.Lindb.
50 ***S. lenense*** H.Lindb. ex L.I.Savicz
51 ***S. lindbergii*** Schimp.
52 ***S. majus*** (Russow) C.E.O.Jensen
a subsp. ***majus***
b subsp. ***norvegicum*** Flatberg
53 ***S. obtusum*** Warnst.
54 ***S. pulchrum*** (Lindb. ex Braithw.) Warnst.
55 ***S. recurvum*** P.Beauv. [171]

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[167] *Sphagnum tescorum* was found in subarctic European Russia in 2016 (Laine et al. 2018).

[168] *Sphagnum venustum* was described from eastern Canada (Flatberg 2008).It is amphi-Atlantic, with a single location found recently in Norway (Laine et al. 2018).

[169] *Sphagnum viride* was treated as a synonym of *Sphagnum cuspidatum* by Hill et al. (2006), then as a variety by Lönnell and Hassel (2018). Hanssen et al. (2000) found that the molecular evidence for differentiation is slight. They further suggested that ”the different distribution patterns found in north-western Europe speak in favour of a separation at the subspecies rank, but we consider a formal taxonomic decision premature at this point”. Laine et al. (2018) state that ”the taxonomic status of this species is still somewhat unclear in relation to *Sphagnum cuspidatum*”. We follow Lönnell and Hassel (2018) pending further molecular work.

[170] The new combinations for *Sphagnum brevifolium* and *Sphagnum isoviitae* were proposed by Lönnell & Hassel (2018), although further molecular studies are needed to clarify their status conclusively. It has been observed that the three varieties of *Sphagnum fallax* are morphologically rather stable in each of their preferred habitats, and it may be that epigenetic processes are involved in the expression of *Sphagnum fallax* phenotypes.

[171] *Sphagnum recurvum* s.str. is essentially an American taxon recently found in the Azores (Dias et al. 2009). Historically the name was used in a wider sense, encompassing *Sphagnum fallax*, *Sphagnum angustifolium* and *Sphagnum flexuosum*.

56 ***S. riparium*** Ångstr.
57 ***S. tenellum*** (Brid.) Pers. ex Brid.
58 ***S. troendelagicum*** Flatberg

ANDREAEOPSIDA J.H.SCHAFFN.

Andreaeales Limpr.

Andreaeaceae Dumort.

2 ***Andreaea*** Hedw.
section *Chasmocalyx* Lindb. ex Braithw.
1 ***A. nivalis*** Hook.
section *Nerviae* Cardot ex G.Roth
2 ***A. blyttii*** Schimp.
3 ***A. crassinervia*** Bruch
4 ***A. frigida*** Huebener
5 ***A. heinemannii*** Hampe & Müll.Hal.
a subsp. ***crassifolia*** (Luisier) Sérgio
b subsp. ***heinemannii***
6 ***A. megistospora*** B.M.Murray
7 ***A. rothii*** F.Weber & D.Mohr
a subsp. ***falcata*** (Schimp.) Lindb.
b subsp. ***rothii***
section *Andreaea*
8 ***A. alpestris*** (Thed.) Schimp. [*Andreaea rupestris* var. *alpestris* (Thed.) Sharp]
9 ***A. alpina*** Hedw. [*Andreaea hartmanii* Thed., *Andreaea obovata* Thed.] [172]
10 ***A. flexuosa*** R.Br. bis
a subsp. ***luisieri*** Sérgio & Sim-Sim [173]
11 ***A. hookeri*** Schimp. [*Andreaea alpina* auct.mult.] [174]
12 ***A. mutabilis*** Hook.f. & Wilson
13 ***A. rupestris*** Hedw.
a var. ***papillosa*** (Lindb.) Podp.
b var. ***rupestris***
14 ***A. sinuosa*** B.M.Murray

OEDIPODIOPSIDA GOFFINET & W.R.BUCK

Oedipodiales Goffinet & W.R.Buck

Oedipodiaceae Schimp.

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[172] The confused history of *Andreaea alpina* and *Andreaea hookeri* was elucidated by Price and Ellis (2018), who describe the problems associated with the name '*Andreaea alpina*' and the type specimens associated with that name. In consequence, the species previously and widely known as '*Andreaea alpina*' must now be called *Andreaea hookeri*, while *Andreaea alpina*, for which a lectotype is designated by Price and Ellis (2018), applies to the species previously known as *Andreaea obovata*.

[173] *Andreaea flexuosa* subsp. *luisieri* is a new taxon described from Madeira (Sérgio and Sim-Sim 2012); subsp. *flexuosa* occurs in the Southern Hemisphere.

[174] See footnote on *Andreaea alpina*, above. *Andreaea hookeri* is therefore the correct name for the plant generally known previously as *Andreaea alpina*.

3 ***Oedipodium*** Schwägr.
1 ***O. griffithianum*** (Dicks.) Schwägr.

TETRAPHIDOPSIDA GOFFINET & W.R.BUCK

Tetraphidales M.Fleisch.

Tetraphidaceae Schimp.

4 ***Tetraphis*** Hedw.
1 ***T. pellucida*** Hedw.

5 ***Tetrodontium*** Schwägr.
1 ***T. brownianum*** (Dicks.) Schwägr.
2 ***T. ovatum*** (Funck) Schwägr.
3 ***T. repandum*** (Funck) Schwägr.

POLYTRICHOPSIDA DOWELD

Polytrichales M.Fleisch.

Polytrichaceae Schwägr.

6 ***Alophosia*** Card.
1 ***A. azorica*** (Renauld & Cardot) Cardot

7 ***Atrichum*** P.Beauv.
1 ***A. androgynum*** (Müll.Hal.) A.Jaeger [175]
2 ***A. angustatum*** (Brid.) Bruch & Schimp.
3 ***A. crispum*** (James) Sull.
4 ***A. flavisetum*** Mitt.
5 ***A. tenellum*** (Röhl.) Bruch & Schimp.
6 ***A. undulatum*** (Hedw.) P.Beauv.

8 ***Oligotrichum*** DC.
1 ***O. hercynicum*** (Hedw.) Lam. & DC.

9 ***Pogonatum*** P.Beauv.
1 ***P. aloides*** (Hedw.) P.Beauv.
2 ***P. dentatum*** (Menzies ex Brid.) Brid.
3 ***P. nanum*** (Hedw.) P.Beauv.
4 ***P. neesii*** (Müll.Hal.) Dozy
5 ***P. urnigerum*** (Hedw.) P.Beauv.

10 ***Polytrichastrum*** G.L.Sm. [176]
1 ***P. alpinum*** (Hedw.) G.L.Sm. [*Polytrichastrum norwegicum* (Hedw.) Schljakov, *Polytrichum alpinum* Hedw., *Polytrichum alpinum* var. *arcticum* (Sw. ex Brid.) Wahlenb.]
2 ***P. altaicum*** Ignatov & G.L.Merr. [177]

[175] *Atrichum androgynum* was reported from Macaronesia and Portugal by Sérgio et al. (2010).
[176] The composition of *Polytrichastrum* in Russia was clarified by Ivanova et al. (2014).
[177] *Polytrichastrum altaicum* was described from the Altai Mountains in Asiatic Russia (Ignatov and Smith Merrill (1995), and later also located in European Russia and Finnish Lapland (Ivanova et al. 2014).

3 ***P. fragile*** (Bryhn) Schljakov [*Polytrichastrum alpinum* var. *fragile* (Bryhn) D.G.Long, *Polytrichum fragile* Bryhn] [178]
4 ***P. septentrionale*** (Brid.) E.I.Ivanova, N.E.Bell & Ignatov [*Polytrichastrum alpinum* var. *septentrionale* (Sw. ex Brid.) G.L.Sm., *Polytrichum septentrionale* Brid.] [179]
5 ***P. sexangulare*** (Brid.) G.L.Sm. [*Polytrichum sexangulare* Hedw.]
6 ***P. sphaerothecium*** (Besch.) J.-P.Frahm [*Polytrichastrum sexangulare* var. *vulcanicum* (C.E.O.Jensen) G.L.Merr., *Polytrichum sphaerothecium* (Besch.) Müll.Hal.]

11 ***Polytrichum*** Hedw.
1 ***P. commune*** Hedw. [*Polytrichum commune* var. *commune*, *Polytrichum commune* var. *uliginosum* Wallr., *Polytrichum uliginosum* (Wallr.) Schriebl] [180]
2 ***P. densifolium*** Wilson ex Mitt. [*Polytrichastrum formosum* var. *densifolium* (Wilson ex Mitt.) Z.Iwats. & Nog., *Polytrichum formosum* var. *densifolium* (Wilson ex Mitt.) Osada] [181]
3 ***P. formosum*** Hedw. [*Polytrichastrum formosum* (Hedw.) G.L.Sm.] [182]
4 ***P. hyperboreum*** R.Br.
5 ***P. jensenii*** I.Hagen
6 ***P. juniperinum*** Hedw.
7 ***P. longisetum*** Sw. ex Brid. [*Polytrichastrum longisetum* (Sw. ex Brid.) G.L.Sm.] [183]
8 ***P. pallidisetum*** Funck [*Polytrichastrum pallidisetum* (Funck) G.L.Sm.] [184]

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[178] *Polytrichastrum fragile* was treated at species level by Ivanova et al. (2014).
[179] *Polytrichastrum septentrionale* was treated at species level by Ivanova et al. (2014).
[180] *Polytrichum commune* var. *uliginosum* Wallr.was raised to specific rank by Schriebl (1991) following his observation of stability in the described diagnostic features in culture. Hill et al. (2006) accepted this view, supported partially by Bijlsma et al. (2000), who found two distinct genetic entities within *Polytrichum commune* s.lat. that they recognised as *Polytrichum uliginosum* and *Polytrichum commune*, with *Polytrichum commune* var. *perigoniale* (Michx.) Hampe treated under *Polytrichum commune*. Subsequent molecular and herbarium studies (Bell et al. 2010, Kariyawasam et al. in prep), have confirmed that these two genetic entities exist, although they show that *Polytrichum uliginosum* should be treated under *Polytrichum commune* while *Polytrichum perigoniale* Michx. is the correct name for the other entity. This is because Bijlsma et al. (2000) based their sampling of *Polytrichum commune* on Schriebl's concept of the species, with specimens corresponding to *Polytrichum commune* var. *perigoniale* (as can be seen in their Fig. 1C), while the concept of *Polytrichum uliginosum* they used presumably included plants corresponding morphologically to *Polytrichum commune* var. *commune*. The type of *Polytrichum commune* in the Hedwig-Schwägrichen-herbarium comprises nine stems on a single herbarium sheet. Some of these appear to have been added by Schwägrichen for comparison purposes and are assignable to *Polytrichum juniperinum*, *Polytrichum appressum* (=*Polytrichum subpilosum*) and *Polytrichum perigoniale*. Six others match Hedwig's original description of *Polytrichum commune* and descriptions in the literature he cited, as well as the concept of *Polytrichum commune* var. *commune* traditionally used in Europe. Of these, one will be selected as a lectotype for *Polytrichum commune* (Kariyawasam, in prep). See also footnote to *Polytrichum perigoniale*, below.
[181] Originally described in 1859 from Sikkim in India (Mitten 1859), *Polytrichum densifolium* was overlooked in Europe (and elsewhere), where specimens were assigned to *Polytrichum formosum*. Most Russian specimens previously named *Polytrichum formosum* were transferred to *Polytrichum densifolium* by Ivanova et al. (2015), and it seems likely that many other eastern European occurrences of '*Polytrichum formosum*' may also prove to be *Polytrichum densifolium*.
[182] *Polytrichastrum formosum* was returned to *Polytrichum* by Bell and Hyvönen (2010), a treatment followed by Ivanova et al. (2014) and others.
[183] *Polytrichastrum longisetum* was returned to *Polytrichum* by Bell and Hyvönen (2010), a treatment followed by Ivanova et al. (2014) and others.

9 ***P. perigoniale*** Michx. [*Polytrichum commune* var. *humile* Sw., *Polytrichum commune* var. *perigoniale* (Michx.) Hampe] [185]
10 ***P. piliferum*** Hedw.
11 ***P. strictum*** Menzies ex Brid. [*Polytrichum alpestre* Hoppe]
12 ***P. swartzii*** Hartm. [*Polytrichum commune* var. *swartzii* (Hartm.) Nyholm]

12 ***Psilopilum*** Brid.
1 ***P. cavifolium*** (Wilson) I.Hagen
2 ***P. laevigatum*** (Wahlenb.) Lindb.

BRYOPSIDA PAX

Buxbaumiales M.Fleisch.

Buxbaumiaceae Schimp.

13 ***Buxbaumia*** Hedw.
1 ***B. aphylla*** Hedw.
2 ***B. viridis*** (Moug. ex Lam. & DC.) Brid. ex Moug. & Nestl.

Diphysciales M.Fleisch.

Diphysciaceae M.Fleisch.

14 ***Diphyscium*** D.Mohr
1 ***D. foliosum*** (Hedw.) D.Mohr

Timmiales Ochyra

Timmiaceae Schimp.

15 ***Timmia*** Hedw.
section *Timmiaurea* Brassard
1 ***T. austriaca*** Hedw.
section *Timmia*
2 ***T. bavarica*** Hessl.
3 ***T. megapolitana*** Hedw.
section *Norvegica* Brassard
4 ***T. comata*** Lindb. & Arnell
5 ***T. norvegica*** J.E.Zetterst.
6 ***T. sibirica*** Lindb. & Arnell

Encalyptales Dixon

Encalyptaceae Schimp.

16 ***Bryobrittonia*** Williams
1 ***B. longipes*** (Mitt.) D.G.Horton

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[184] *Polytrichastrum pallidisetum* was returned to *Polytrichum* by Bell and Hyvönen (2010), a treatment followed by Ivanova et al. (2014) and others.

[185] Molecular evidence (e.g. Bell et al. 2010, Kariyawasam et al. in prep.) clearly shows *Polytrichum perigonale* to be more closely related to a number of non-European species than to *Polytrichum commune* s.str., thus necessitating its recognition as a full species rather than a variety of *Polytrichum commune*. The type (G) has been examined by Kariyawasam.

17 ***Encalypta*** Hedw.
section *Streptotheca* (Kindb.) Broth.
1 ***E. procera*** Bruch
2 ***E. streptocarpa*** Hedw.
section *Pyromitrium* Wallr. ex Hampe
3 ***E. alpina*** Sm.
4 ***E. mutica*** I.Hagen
section *Rhabdotheca* Müll.Hal.
5 ***E. pilifera*** Funck [*Encalypta obovatifolia* Nyholm, *Encalypta intermedia* Jur.] [186]
6 ***E. rhaptocarpa*** Schwägr.
7 ***E. spathulata*** Müll.Hal. [*Encalypta rhaptocarpa* var. *spathulata* (Müll.Hal.) Husn.]
8 ***E. trachymitria*** Ripart [*Encalypta rhaptocarpa* var. *leptodon* Lindb., *Encalypta rhaptocarpa* var. *trachymitria* (Ripart) Wijk & Margad.] [187]
9 ***E. vulgaris*** Hedw.
section *Megasporae* D.G.Horton
10 ***E. longicolla*** Bruch
section *Encalypta*
11 ***E. affinis*** R.Hedw.
a subsp. ***affinis***
b subsp. ***macounii*** (Austin) D.G.Horton
12 ***E. brevicolla*** (Bruch & Schimp.) Ångstr.
13 ***E. brevipes*** Schljakov
14 ***E. ciliata*** Hedw.
15 ***E. microstoma*** Bals.-Criv. & De Not.

Funariales M.Fleisch.

Funariaceae Schwägr.
Pyramiduloideae O.Werner, Ros & Goffinet[188]

18 ***Goniomitrium*** Hook.f. & Wilson
16 ***G. seroi*** Casas

19 ***Pyramidula*** Brid.
1 ***P. tetragona*** (Brid.) Brid.

Funarioideae Broth.

20 ***Entosthodon*** Schwägr.
Subgenus *Entosthodon*
1 ***E. abramovae*** Fedosov & Ignatova [189]
2 ***E. attenuatus*** (Dicks.) Bryhn

[186] Molecular studies by Fedosov (2012) showed that *Encalypta pilifera* is one of the most isolated taxa in sect. *Rhabdotheca*, thus justifying specific status, and *E. pilifera* is the earliest published name.
[187] Fedosov (2012) proposed the recognition of *Encalypta trachymitria* at specific level on the basis of molecular studies on Russian material.
[188] The position of *Goniomitrium* and *Pyramidula* in a subfamily within the Funariaceae was confirmed using molecular data by Werner et al. (2007).
[189] *Entosthodon abramovae* was described from the Caucasus by Fedosov et al. (2010).

3 ***E. commutatus*** Durieu & Mont. [*Entosthodon krausei* Besch.] [190]
4 ***E. dagestanicus*** Fedosov & Ignatova [191]
5 ***E. duriaei*** Mont. [192]
6 ***E. handelii*** (Schiffn.) Laz. [*Funaria handelii* Schiffn.] [193]
7 ***E. hungaricus*** (Boros) Loeske
8 ***E. kroonkurk*** Dirkse & Brugués [194]
9 ***E. obtusus*** (Hedw.) Lindb.
10 ***E. stenophyllus*** Fedosov & Ignatova [195]

Subgenus *Plagiodus* (Mitt.) Fife
11 ***E. convexus*** (Spruce) Brugués
12 ***E. muhlenbergii*** (Turner) Fife
13 ***E. pulchellus*** (H.Philib.) Brugués
14 ***E. schimperi*** Brugués

Subgenus *Murcia* Fife
15 ***E. fascicularis*** (Hedw.) Müll.Hal.
16 ***E. mouretii*** (Corb.) Jelenc

21 ***Funaria*** Schwägr. [196]
1 ***F. aequidens*** Lindb. ex Broth.
2 ***F. arctica*** (Berggr.) Kindb.
3 ***F. hygrometrica*** Hedw.
4 ***F. microstoma*** Bruch ex Schimp.

22 ***Funariella*** Sérgio
1 ***F. curviseta*** (Schwägr.) Sérgio

23 ***Physcomitrium*** (Brid.) Brid. [*Aphanorrhegma* Sull., *Physcomitrella* Bruch & Schimp., *Physcomitridium* G.Roth] [197]
1 ***P. arenicola*** Laz.
2 ***P. eurystomum*** Sendtn.
a subsp. ***acuminatum*** (Bruch & Schimp.) Giacom.
b subsp. ***eurystomum***
3 ***P. patens*** (Hedw.) Mitt. [*Aphanorrhegma patens* (Hedw.) Lindb., *Physcomitrella patens* (Hedw.) Bruch & Schimp.]
4 ***P. pyriforme*** (Hedw.) Bruch & Schimp.
5 ***P. readeri*** Müll.Hal. [*Ephemerella readeri* Müll.Hal., *Physcomitrella readeri* (Müll.Hal.) I.G.Stone & G.A.M.Scott, *Physcomitridium readeri* (Müll.Hal.) G.Roth] [198]

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[190] *Entosthodon krausei* was synonymised with *Entosthodon commutatus* by Brugués and Sérgio (2010).
[191] *Entosthodon dagestanicus* was described from the Caucasus by Fedosov et al. (2010).
[192] According to Ros et al. (2013), all occurrences of the epithet '*durieui*', and combinations based on it, need to be changed to '*duriaei*', because that is the original spelling.
[193] *Entosthodon handelii* was reported from the Caucasus new to Europe by Fedosov et al. (2010).
[194] *Entosthodon kroonkurk* was described from Spain and the Canary Islands by Dirkse and Brugués (2010).
[195] *Entosthodon stenophyllus* was described from the Caucasus by Fedosov et al. (2010).
[196] *Funaria anomala* Jur. is a little-known taxon described from Cyprus by Juratzka in Unger and Kotschy (1865). It has also been reported from Egypt and SW Asia. Its status is doubtful. Loeske (1929), who examined the type collection, suggested that it could be a hybrid between female *Entosthodon templetoni* (*Entosthodon attenuatus*) and male *Funaria dentata* (*Funaria muhlenbergii* s.lat.). There have been no subsequent reports from Cyprus, and the taxon is therefore not included in the checklist.
[197] Medina et al. (2019) concluded that there are no morphological or molecular grounds for maintaining *Physcomitrella* and *Physcomitridium* as separate genera from *Physcomitrium*.

6 ***P. sphaericum*** (C.F.Ludw. ex Schkuhr) Brid.

Disceliaceae Schimp.

24 ***Discelium*** Brid.
1 ***D. nudum*** (Dicks.) Brid.

Gigaspermales Goffinet, Wickett, O.Werner, Ros, A.J.Shaw & C.J.Cox

Gigaspermaceae Lindb.

25 ***Gigaspermum*** Lindb.
1 ***G. mouretii*** Corb.

26 ***Oedipodiella*** Dixon
1 ***O. australis*** (Wager & Dixon) Dixon

Catoscopiales Ignatov & Ignatova

Catoscopiaceae Broth.

27 ***Catoscopium*** Brid.
1 ***C. nigritum*** (Hedw.) Brid.

Dicranales H.Philib ex M.Fleisch. [199]

Timmiellaceae Y.Inoue & H.Tsubota [200]

28 ***Timmiella*** (De Not.) Limpr.
1 ***T. anomala*** (Bruch & Schimp.) Limpr.
2 ***T. barbuloides*** (Brid.) Mönk.
3 ***T. flexiseta*** (Bruch) Limpr.

Distichiaceae Schimp. [201]

29 ***Distichium*** Bruch & Schimp.
1 ***D. capillaceum*** (Hedw.) Bruch & Schimp.
2 ***D. hagenii*** Ryan ex H.Philib.
3 ***D. inclinatum*** (Hedw.) Bruch & Schimp.

Hymenolomataceae Ignatov & Fedosov[202]

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[198] *Physcomitrium readeri* was reported, as *Ephemerella readeri*, new to Europe by Hooper et al. (2010). It was moved to *Physcomitridium* by Goffinet and Buck (2011), and is now in *Physcomitrium* (Medina et al. 2019).

[199] The order Dicranales is here pragmatically broadened to include the basal lineages of haplolepidous mosses (Proto-Haplolepidae of Hedderson et al. 2004). This decision necessarily results in merging the order Pottiales with Dicranales, although we retain Grimmiales as one of the crown groups of Dicranidae.

[200] Inoue and Tsubota (2016) showed through molecular studies that *Timmiella* should be accommodated within a new family, Timmiellaceae, along with the tropical genus *Luisierella*. The evidence also suggests that the family does not belong to the Pottiales but rather to the basal haplolepidous mosses (‘Protohaplolepidae’).

[201] Fedosov et al. (2016a) provided molecular evidence that *Distichium* cannot be placed in the Ditrichaceae, They therefore resurrected the family Distichiaceae, which had not been used for more than a century. Further molecular evidence suggests that the Distichiaceae do not belong to the Dicranales but rather to the basal haplolepidous mosses (‘Protohaplolepidae’).

30 ***Hymenoloma*** Dusén
- 1 ***H. compactum*** (Schleich. ex Schwägr.) Ochyra [*Dicranoweisia compacta* (Schleich. ex Schwägr.) Schimp., *Dicranoweisia crispula* var. *compacta* (Schwägr.) Lindb.]
- 2 ***H. crispulum*** (Hedw.) Ochyra [*Dicranoweisia crispula* (Hedw.) Milde]
- 3 ***H. mulahaceni*** (Höhn.) Ochyra [*Dicranoweisia crispula* var. *intermedia* (J.J.Amann) Podp., *Dicranoweisia intermedia* J.J.Amann, *Hymenoloma intermedium* (J.J.Amann) Ochyra] [203]

Flexitrichaceae Ignatov & Fedosov [204]

31 ***Flexitrichum*** Ignatov & Fedosov
- 1 ***F. flexicaule*** (Schwägr.) Ignatov & Fedosov [*Ditrichum flexicaule* (Schwägr.) Hampe]
- 2 ***F. gracile*** (Mitt.) Ignatov & Fedosov [*Ditrichum crispatissimum* (Müll.Hal.) Paris, *Ditrichum gracile* (Mitt.) Kuntze]

Bryoxiphiaceae Besch.

32 ***Bryoxiphium*** Brid.
- 1 ***B. madeirense*** Á.Löve & D.Löve
- 2 ***B. norvegicum*** (Brid.) Mitt.

Archidiaceae Schimp.

33 ***Archidium*** Brid.
- 1 ***A. alternifolium*** (Hedw.) Mitt.

Micromitriaceae Smyth ex Goffinet & Budke [205]

34 ***Micromitrium*** Austin
- 1 ***M. tenerum*** (Bruch & Schimp.) Crosby

Leucobryaceae Schimp.

35 ***Atractylocarpus*** Mitt.
- 1 ***A. alpinus*** (Schimp. ex Milde) Lindb.
- 2 ***A. subporodictyon*** (Broth.) Bonfim Santos & M.Stech [*Campylopus subporodictyon* (Broth.) B.H.Allen & Ireland, *Dicranodontium subporodictyon* Broth., *Dicranum subporodictyon* (Broth.) C.Gao & T.Gao] [206]

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[202] Fedosov et al. (2016b) place the genus *Hymenoloma* in a family of its own, the Hymenolomataceae. The relationships of the species in *Hymenoloma* and *Dicranoweisia* were elucidated by Werner et al. (2013).

[203] *Hymenoloma mulahaceni* is a Holarctic species whose taxonomy and distribution is described by Werner et al. (2013).

[204] The family Flexitrichaceae was described as new on the basis of molecular evidence (Fedosov et al. 2016a), which places it apart from Ditrichaceae. As with the Distichiaceae, molecular evidence suggests that the Flexitrichaceae do not belong to the Dicranales but rather to the basal haplolepidous mosses ('Protohaplolepidae').

[205] The Micromitriaceae is a new family described by Goffinet et al. (2011) on molecular grounds. Its affinities with Dicranidae have not yet been clarified but it might be close to taxa basal to Leucobryaceae (cf. Bonfim Santos & Stech 2017, Stech et al. 2012).

[206] Recent molecular work shows *Campylopus subporodictyon* to be best placed in *Atractylocarpus* (Bonfim Santos and Stech 2017).

36 ***Campylopus*** Brid.
- 1 ***C. atrovirens*** De Not. [*Campylopus atrovirens* var. *falcatus* Braithw.]
- 2 ***C. brevipilus*** Bruch & Schimp.
- 3 ***C. cygneus*** (Hedw.) Brid.
- 4 ***C. flaccidus*** Renauld & Cardot
- 5 ***C. flexuosus*** (Hedw.) Brid.
- 6 ***C. fragilis*** (Brid.) Bruch & Schimp.
- 7 ***C. gracilis*** (Mitt.) A.Jaeger [*Campylopus schwarzii* Schimp.]
- 8 ***C. incrassatus*** Müll.Hal.
- 9 ***C. introflexus*** (Hedw.) Brid.
- 10 ***C. oerstedianus*** (Müll.Hal.) Mitt.
- 11 ***C. pilifer*** Brid.
- 12 ***C. pyriformis*** (Schultz) Brid. [*Campylopus pyriformis* var. *azoricus* (Mitt.) M.F.V.Corley]
- 13 ***C. schimperi*** Milde [*Campylopus subulatus* var. *schimperi* (Milde) Husn.] [207]
- 14 ***C. setifolius*** Wilson
- 15 ***C. shawii*** Wilson
- 16 ***C. subulatus*** Schimp. ex Milde[208]

37 ***Dicranodontium*** Bruch & Schimp.
- 1 ***D. asperulum*** (Mitt.) Broth.
- 2 ***D. denudatum*** (Brid.) E.Britton [*Dicranodontium denudatum* var. *alpinum* (Schimp.) I.Hagen]
- 3 ***D. uncinatum*** (Harv.) A.Jaeger

38 ***Leucobryum*** Hampe
- 1 ***L. albidum*** (P.Beauv.) Lindb. [209]
- 2 ***L. glaucum*** (Hedw.) Ångstr.
- 3 ***L. juniperoideum*** (Brid.) Müll.Hal.

Amphidiaceae M.Stech

39 ***Amphidium*** Schimp.
- 1 ***A. lapponicum*** (Hedw.) Schimp.
- 2 ***A. mougeotii*** (Schimp.) Schimp.
- 3 ***A. curvipes*** (Müll.Hal.) Broth. [*Amphidium tortuosum* auct. eur.]

Aongstroemiaceae De Not.

40 ***Aongstroemia*** Schimp.
- 1 ***A. longipes*** (Sommerf.) Bruch & Schimp.

41 ***Dichodontium*** Schimp.

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[207] *Campylopus schimperi* is often treated as a variety of *Campylopus subulatus* (e.g. Meinunger and Schröder 2007) but we follow Hill et al. (2006) in retaining it at species level. Although they are difficult to separate in some parts of their range, *Campylopus schimperi* is usually very distinct in size, habit and habitat.

[208] Because of inconsistencies regarding their respective habitats, there is some doubt that the taxon commonly identified as *Campylopus subulatus* is the same as the type specimen; this therefore requires clarification.

[209] Vanderpoorten et al. (2003) suggested that *Leucobryum albidum* is synonymous with *Leucobryum juniperoideum*. However, the two species were included by Hill et al. (2016), and in the absence of further work are retained here. The identification of the three European species is discussed by Simmel and Poschlod (2017).

1 ***D. flavescens*** (Dicks.) Lindb.
2 ***D. pellucidum*** (Hedw.) Schimp.

42 ***Diobelonella*** Ochyra [210]
1 ***D. palustris*** (Dicks.) Ochyra [*Anisothecium palustre* (Dicks.) I.Hagen, *Dichodontium palustre* (Dicks.) M.Stech, *Dicranella palustris* (Dicks.) Crundw.]

Dicranellaceae M.Stech

43 ***Dicranella*** (Müll.Hal.) Schimp.
1 ***D. campylophylla*** (Taylor) A.Jaeger
2 ***D. cerviculata*** (Hedw.) Schimp.
3 ***D. crispa*** (Hedw.) Schimp.
4 ***D. grevilleana*** (Brid.) Schimp.
5 ***D. heteromalla*** (Hedw.) Schimp.
6 ***D. howei*** Renauld & Cardot
7 ***D. humilis*** R.Ruthe
8 ***D. rufescens*** (Dicks.) Schimp.
9 ***D. schreberiana*** (Hedw.) Dixon
10 ***D. staphylina*** H.Whitehouse
11 ***D. subulata*** (Hedw.) Schimp.
12 ***D. varia*** (Hedw.) Schimp.

44 ***Microcampylopus*** (Müll.Hal.) M.Fleisch.
1 ***M. laevigatus*** (Thér.) Giese & J.-P.Frahm

Fissidentaceae Schimp.

45 ***Fissidens*** Hedw.
Subgenus *Pachyfissidens* (Müll.Hal.) L.Söderstr. & A.Hagborg
section *Pachyfissidens* Müll.Hal.
1 ***F. adianthoides*** Hedw.
2 ***F. azoricus*** (P.de la Varde) Bizot
3 ***F. dubius*** P.Beauv. [Fissidens cristatus Wilson ex Mitt.]
a var. ***dubius***
b var. ***mucronatus*** (Limpr.) Kartt., Hedenäs & L.Söderstr. [211]
4 ***F. grandifrons*** Brid.
5 ***F. osmundoides*** Hedw.
6 ***F. polyphyllus*** Wilson ex Bruch & Schimp.
7 ***F. serrulatus*** Brid. [*Fissidens luisieri* P.de la Varde] [212]
8 ***F. taxifolius*** Hedw. [*Fissidens taxifolius* subsp. *pallidicaulis* (Mitt.) Mönk] [213]
section *Amblyothallia* (Müll.Hal.) Pursell & Brugg.-Nann.

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[210] Ochyra et al. (2003) proposed a new genus, *Diobelonella*, for *Dichodontium palustre*, which, while it has molecular affinities with *Dichodontium* (Stech 1999), does not sit comfortably there. It is placed alongside *Dichodontium* in the Aongstroemiaceae by Frey and Stech (2009).

[211] *Fissidens dubius* var. *mucronatus* is morphologically characterised by the mucronate apex of the upper leaves. It also has a different ecology. Recent Dutch research also shows differences in DNA sequences between var. *mucronatus* and the type (H.N. Siebel and M. Stech, pers. comm. 2019).

[212] *Fissidens luisieri* may be distinct but further work is necessary. For the present we follow Werner et al. (2009) in treating it as a synonym of *Fissidens serrulatus*.

[213] *Fissidens taxifolius* subsp. *pallidicaulis* intergrades completely with the type subspecies and is therefore treated as a synonym.

9 ***F. asplenioides*** Hedw.

Subgenus *Octodiceras* (Brid.) Broth. [*Octodiceras* Brid.]

10 ***F. fontanus*** (Bach.Pyl.) Steud. [*Octodiceras fontanum* (Bach.Pyl.) Lindb.]

Subgenus *Fissidens*

11 ***F. arcticus*** Bryhn

12 ***F. arnoldii*** R.Ruthe

13 ***F. bryoides*** Hedw.

- a var. ***bryoides***
- b var. ***caespitans*** Schimp. [*Fissidens bryoides* var. *curnovii* (Mitt.) J.J.Amann, *Fissidens curnovii* Mitt.]

14 ***F. coacervatus*** Brugg.-Nann.

15 ***F. crassipes*** Wilson ex Bruch & Schimp.

- a subsp. ***crassipes***
- b subsp. ***warnstorfii*** (M.Fleisch.) Brugg.-Nann.

16 ***F. crispus*** Mont. [*Fissidens herzogii* R.Ruthe ex Herzog, *Fissidens limbatus* Sull., *Fissidens minutulus* Sull.]

17 ***F. curvatus*** Hornsch. [*Fissidens algarvicus* Solms]

18 ***F. gracilifolius*** Brugg.-Nann. & Nyholm [*Fissidens viridulus* var. *tenuifolius* (Boulay) A.J.E.Sm.]

19 ***F. gymnandrus*** Buse

20 ***F. incurvus*** Starke ex Röhl. [*Fissidens viridulus* var. *incurvus* (Starke ex Röhl.) Waldh.] [214]

21 ***F. jansenii*** Sérgio & Pursell

22 ***F. monguillonii*** Thér.

23 ***F. ovatifolius*** R.Ruthe

24 ***F. pusillus*** (Wilson) Milde [*Fissidens viridulus* var. *pusillus* Wilson]

25 ***F. rivularis*** (Spruce) Schimp.

26 ***F. rufulus*** Bruch & Schimp.

27 ***F. sublimbatus*** Grout

28 ***F. sublineaefolius*** (P.de la Varde) Brugg.-Nann.

29 ***F. viridulus*** (Sw.) Wahlenb. [*Fissidens bambergeri* Milde, *Fissidens exiguus* Sull., *Fissidens viridulus* var. *bambergeri* (Schimp.) Waldh.] [215]

Subgenus *Aloma* Kindb.

30 ***F. celticus*** Paton

31 ***F. exilis*** Hedw.

32 ***F. microstictus*** Dixon & Luisier

33 ***F. nobreganus*** Dixon & Luisier

34 ***F. serratus*** Müll.Hal.

Dicranaceae Schimp.

Dicranoideae Lindb.

46 ***Dicranoloma*** (Renauld) Renauld

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[214] Although morphological differences with *Fissidens viridulus* are small, recent molecular studies show that the closest relative of *Fissidens incurvus* is not *Fissidens viridulus* (H.N. Siebel and M. Stech, pers. comm. 2019). It is therefore reinstated as a species.

[215] The status of *Fissidens bambergeri* and *Fissidens exiguus*, treated here as synonyms of *Fissidens viridulus*, remains problematic. In a recent DNA study, it appeared that an incompletely limbate species of the *Fissidens bryoides* complex from the Netherlands was different from *Fissidens viridulus* (H.N. Siebel and M. Stech, pers. comm. 2019). However, several incompletely limbate species in this complex have been described. A morphological and molecular revision of these species is needed.

1 ***D. menziesii*** (Taylor) Broth. ex Renauld [216]

47 ***Dicranum*** Hedw. [217]

section *Dicranum*

1 ***D. bonjeanii*** De Not. [*Dicranum undulatum* Turner, *nom. illeg*.]
2 ***D. crassifolium*** Sérgio, Ochyra & Séneca
3 ***D. leioneuron*** Kindb.
4 ***D. majus*** Sm.
5 ***D. polysetum*** Sw. ex anon. [*Dicranum rugosum* Brid., *Dicranum undulatum* Ehrh. ex F.Weber & D.Mohr, *nom. illeg*.]
6 ***D. scoparium*** Hedw.
7 ***D. transsylvanicum*** Lüth

section *Spuria* Bruch & Schimp.

8 ***D. acutifolium*** (Lindb. & Arnell) C.E.O.Jensen [*Dicranum bergeri* var. *acutifolium* Lindb. & Arnell, *Dicranum muehlenbeckii* var. *acutifolium* (Lindb. & Arnell) Nyholm]
9 ***D. bardunovii*** Tubanova & Ignatova [218]
10 ***D. brevifolium*** (Lindb.) Lindb. [*Dicranum muehlenbeckii* var. *brevifolium* Lindb., *Dicranum muehlenbeckii* var. *cirrhatum* (Schimp.) Lindb.]
11 ***D. dispersum*** Engelmark
12 ***D. drummondii*** Müll.Hal.
13 ***D. septentrionale*** Tubanova & Ignatova [219]
14 ***D. spurium*** Hedw.
15 ***D. undulatum*** Schrad. ex Brid. [*Dicranum bergeri* Blandow]

section *Fuscescentiformia* (Kindb.) Ochyra

16 ***D. flexicaule*** Brid. [*Dicranum congestum* Brid., *Dicranum fuscescens* var. *congestum* (Brid.) Kindb., *Dicranum fuscescens* var. *flexicaule* (Brid.) Wilson]
17 ***D. fuscescens*** Sm.

section *Convolutifolia* (Kindb.) Ochyra

18 ***D. angustum*** Lindb.
19 ***D. muehlenbeckii*** Bruch & Schimp.
20 ***D. schljakovii*** Ignatova & Tubanova [220]
21 ***D. spadiceum*** J.E.Zetterst.

section *Elongata* I.Hagen

22 ***D. elongatum*** Schleich. ex Schwägr.
23 ***D. fragilifolium*** Lindb.
24 ***D. groenlandicum*** Brid.
25 ***D. laevidens*** R.S.Williams

section *Crassinervia* G.Roth

26 ***D. fulvum*** Hook. [*Orthodicranum fulvum* (Hook.) G.Roth ex Casares-Gil]

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[216] *Dicranoloma menziesii*, a native of Australia and New Zealand, has been recorded on tree ferns in southern Ireland (Holyoak and Lockhart 2009).

[217] Although this sectional classification of *Dicranum* is retained for now, the findings of Lang et al. (2015) suggest that it will have to be revised.

[218] *Dicranum bardunovii* was described from Siberia (Tubanova and Ignatova 2011) but later found in the European part of the Urals (E. Ignatova pers. comm. 2018).

[219] *Dicranum septentrionale* was described from Russia by Tubanova et al. (2010). It has since been found in Scandinavia and Austria.

[220] *Dicranum schljakovii* was described from Russia by Ignatova et al. (2015).

27 ***D. scottianum*** Turner [*Dicranum canariense* Hampe ex Müll.Hal., *Orthodicranum scottianum* (Turner) G.Roth ex Casares-Gil] [221]
28 ***D. viride*** (Sull. & Lesq.) Lindb.

section *Montana* Hartm.

29 ***D. flagellare*** Hedw. [*Orthodicranum flagellare* (Hedw.) Loeske]
30 ***D. montanum*** Hedw. [*Orthodicranum montanum* (Hedw.) Loeske]
31 ***D. tauricum*** Sapjegin [*Dicranum strictum* Schleich. ex D.Mohr, *hom. illeg.*, *Orthodicranum tauricum* (Sapjegin) Smirnova]

48 ***Paraleucobryum*** (Limpr.) Loeske
1 ***P. enerve*** (Thed.) Loeske
2 ***P. longifolium*** (Hedw.) Loeske
3 ***P. sauteri*** (Bruch & Schimp.) Loeske [*Paraleucobryum longifolium* var. *sauteri* (Bruch & Schimp.) C.E.O.Jensen]

Calymperaceae Kindb.

49 ***Calymperes*** Michx.
1 ***C. erosum*** Müll.Hal.

Rhabdoweisiaceae Limpr. [Oncophoraceae M.Stech]

50 ***Arctoa*** Schimp.
1 ***A. anderssonii*** Wich.
2 ***A. fulvella*** (Dicks.) Bruch & Schimp.
3 ***A. hyperborea*** (Gunnerus ex Dicks.) Bruch & Schimp.

51 ***Cnestrum*** I.Hagen
1 ***C. alpestre*** (Wahlenb. ex Huebener) Nyholm ex Mogensen
2 ***C. glaucescens*** (Lindb. & Arnell) Holmen ex Mogensen & Steere
3 ***C. schisti*** (F.Weber & D.Mohr) I.Hagen

52 ***Cynodontium*** Bruch & Schimp.
1 ***C. asperifolium*** (Lindb. ex Arnell) Paris
2 ***C. bruntonii*** (Sm.) Bruch & Schimp.
3 ***C. fallax*** Limpr.
4 ***C. gracilescens*** (F.Weber & D.Mohr) Schimp.
5 ***C. jenneri*** (Schimp.) Stirt.
6 ***C. polycarpon*** (Hedw.) Schimp.
7 ***C. strumiferum*** (Hedw.) Lindb.
8 ***C. suecicum*** (Arnell & C.E.O.Jensen) I.Hagen
9 ***C. tenellum*** (Schimp.) Limpr.

53 ***Dicranoweisia*** Milde
1 ***D. cirrata*** (Hedw.) Lindb.

54 ***Glyphomitrium*** Brid.
1 ***G. daviesii*** (Dicks.) Brid.

55 ***Kiaeria*** I.Hagen
1 ***K. blyttii*** (Bruch & Schimp.) Broth.

[221] Price et al. (2019) clarified the correct authorship of *Dicranum scottianum*. Recent molecular work suggests that *Dicranum canariense* should be considered a synonym of *Dicranum scottianum* (A. Vanderpoorten pers. comm. 2017). Morphological studies also support this conclusion (Price et al. 2019).

2 ***K. falcata*** (Hedw.) I.Hagen
3 ***K. glacialis*** (Berggr.) I.Hagen
4 ***K. riparia*** (H.Lindb.) M.F.V.Corley [*Dicranella riparia* (H.Lindb.) Mårtensson & Nyholm, *Oncophorus riparius* H.Lindb.]
5 ***K. starkei*** (F.Weber & D.Mohr) I.Hagen

56 ***Oncophorus*** (Brid.) Brid.
1 ***O. demetrii*** (Renauld & Cardot) Hedenäs [222]
2 ***O. dendrophilus*** Hedd. & Blockeel [223]
3 ***O. elongatus*** (I.Hagen) Hedenäs [224]
4 ***O. integerrimus*** Hedenäs [*Oncophorus virens* var. *elongatus* Limpr.] [225]
5 ***O. virens*** (Hedw.) Brid.
6 ***O. wahlenbergii*** Brid. [*Oncophorus compactus* (Bruch & Schimp.) Kindb., *Oncophorus wahlenbergii* var. *compactus* (Bruch & Schimp.) Braithw.] [226]

57 ***Oreas*** Brid.
1 ***O. martiana*** (Hoppe & Hornsch.) Brid.

58 ***Oreoweisia*** (Bruch & Schimp.) De Not.
1 ***O. torquescens*** (Hornsch. ex Brid.) Wijk & Margad.

59 ***Rhabdoweisia*** Bruch & Schimp.
1 ***R. crenulata*** (Mitt.) H.Jameson
2 ***R. crispata*** (Dicks.) Lindb.
3 ***R. fugax*** (Hedw.) Bruch & Schimp.

Schistostegaceae Schimp.

60 ***Schistostega*** D.Mohr
1 ***S. pennata*** (Hedw.) F.Weber & D.Mohr

Bruchiaceae Schimp.

61 ***Bruchia*** Schwägr.
1 ***B. flexuosa*** (Schwägr.) Müll.Hal.
2 ***B. vogesiaca*** Nestl. ex Schwägr.

62 ***Trematodon*** Michx.
1 ***T. ambiguus*** (Hedw.) Hornsch.
2 ***T. brevicollis*** Hornsch.
3 ***T. laetevirens*** Hakelier & J.-P.Frahm
4 ***T. longicollis*** Michx.
5 ***T. perssoniorum*** P.Allorge & Thér. ex V.Allorge

Ditrichaceae Limpr.

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[222] *Oncophorus demetrii*, a Scandinavian taxon, was recognised as a species by Hedenäs (2018), and has also been found in Arctic Russia.
[223] *Oncophorus dendrophilus* was escribed by Hedderson and Blockeel (2006) and is so far known only from Crete and Cyprus.
[224] The recognition of *Oncophorus elongatus* at species level was confirmed during a revision of Scandinavian *Oncophorus* by Hedenäs (2017a). It has also been found in Russia and France.
[225] *Oncophorus integerrimus* was recognised at species level by Hedenäs (2017a).
[226] *Oncophorus compactus* was synonymised with *Oncophorus wahlenbergii* by Hedenäs (2018).

63 ***Ceratodon*** Brid.
- 1 ***C. amazonum*** Nieto-Lugilde, O.Werner, S.F.McDaniel & Ros [227]
- 2 ***C. conicus*** (Hampe) Lindb. [*Ceratodon purpureus* var. *conicus* (Hampe) Husn.] [228]
- 3 ***C. purpureus*** (Hedw.) Brid.
  - a subsp. ***purpureus***
  - b subsp. ***stenocarpus*** (Bruch. & Schimp. ex Müll.Hal.) Dixon [229]

64 ***Cheilothela*** Broth.
- 1 ***C. chloropus*** (Brid.) Broth.

65 ***Cleistocarpidium*** Ochyra & Bedn.-Ochyra
- 1 ***C. palustre*** (Bruch & Schimp.) Ochyra & Bedn.-Ochyra [*Pleuridium palustre* (Bruch & Schimp.) Bruch & Schimp.]

66 ***Ditrichum*** Timm ex Hampe
- 1 ***D. cornubicum*** Paton
- 2 ***D. heteromallum*** (Hedw.) E.Britton
- 3 ***D. lineare*** (Sw.) Lindb.
- 4 ***D. pallidum*** (Hedw.) Hampe
- 5 ***D. plumbicola*** Crundw.
- 6 ***D. punctulatum*** Mitt.
- 7 ***D. pusillum*** (Hedw.) Hampe
- 8 ***D. subulatum*** Hampe
- 9 ***D. zonatum*** (Brid.) Kindb. [*Ditrichum zonatum* var. *scabrifolium* Dixon]

67 ***Pleuridium*** Rabenh.
- 1 ***P. acuminatum*** Lindb.
- 2 ***P. subulatum*** (Hedw.) Rabenh.

68 ***Pseudephemerum*** (Lindb.) I.Hagen
- 1 ***P. nitidum*** (Hedw.) Loeske

69 ***Rhamphidium*** Mitt.
- 1 ***R. purpuratum*** Mitt.

70 ***Trichodon*** Schimp.
- 2 ***T. cylindricus*** (Hedw.) Schimp. [*Ditrichum cylindricum* (Hedw.) Grout]

Pottiaceae Schimp. [230]
Merceyoideae Broth.

71 ***Scopelophila*** (Mitt.) Lindb.
- 1 ***S. cataractae*** (Mitt.) Broth.

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[227] *Ceratodon amazonum* was described from Spain by Nieto-Lugilde et al. (2018).

[228] *Ceratodon conicus* has been shown to have a hybrid origin (Nieto-Lugilde et al. 2018), with *Ceratodon amazonum* and *Ceratodon purpureus* as parent taxa, and was considered by them a nothospecies, *Ceratodon* x *conicus*. However, it has evidently been forming self-sustaining populations for some time, whereas *Ceratodon amazonum* is apparently a rare species confined to Spain, so it is here considered a true species of hybrid origin.

[229] Nieto-Lugilde et al. (2018) presented molecular data suggesting that specimens corresponding to subsp. *stenocarpus* were not molecularly distinct from subsp. *purpureus*, but a formal synonymy was not made, and the two taxa are retained for the present.

[230] Inoue and Tsubota (2016) used molecular techniques to confirm that there are four clades within the Pottiaceae, corresponding to the subfamilies Trichostomoideae, Pottioideae, Merceyoideae and Streblotrichoideae. Accordingly, the subfamily Barbuloideae (Herzog) Hilp. is no longer used.

2 ***S. ligulata*** (Spruce) Spruce

Pottioideae Broth.

72 ***Acaulon*** Müll.Hal.
- 1 ***A. casasianum*** Brugués & H.A.Crum
- 2 ***A. dertosense*** Casas, Sérgio Cros & Brugués
- 3 ***A. fontiquerianum*** Casas & Sérgio
- 4 ***A. mediterraneum*** Limpr.
- 5 ***A. muticum*** (Hedw.) Müll.Hal.
- 6 ***A. piligerum*** (De Not.) Limpr.
- 7 ***A. triquetrum*** (Spruce) Müll.Hal.

73 ***Aloina*** Kindb.
- 1 ***A. aloides*** (Koch ex Schultz) Kindb.
- 2 ***A. ambigua*** (Bruch & Schimp.) Limpr. [231]
- 3 ***A. bifrons*** (De Not.) Delgad.
- 4 ***A. brevirostris*** (Hook. & Grev.) Kindb.
- 5 ***A. humilis*** M.T.Gallego, M.J.Cano & Ros
- 6 ***A. obliquifolia*** (Müll.Hal.) Broth. [232]
- 7 ***A. rigida*** (Hedw.) Limpr.

74 ***Barbula*** Hedw. [233]
- 1 ***B. unguiculata*** Hedw.

75 ***Bryoerythrophyllum*** P.C.Chen
- 1 ***B. alpigenum*** (Venturi) P.C.Chen
- 2 ***B. caledonicum*** D.G.Long
- 3 ***B. campylocarpum*** (Müll.Hal.) H.A.Crum
- 4 ***B. duellii*** Blockeel [234]
- 5 ***B. ferruginascens*** (Stirt.) Giacom.
- 6 ***B. inaequalifolium*** (Taylor) R.H.Zander
- 7 ***B. recurvirostrum*** (Hedw.) P.C.Chen
- 8 ***B. rubrum*** (Jur. ex Geh.) P.C.Chen

76 ***Chenia*** R.H.Zander [235]
- 1 ***C. leptophylla*** (Müll.Hal.) R.H.Zander [*Leptophascum leptophyllum* (Müll.Hal.) J.Guerra & M.J.Cano]
- 2 ***C. ruigtevleia*** Hedd. & R.H.Zander [236]

77 ***Cinclidotus*** P.Beauv.
- 1 ***C. aquaticus*** (Hedw.) Bruch & Schimp.
- 2 ***C. danubicus*** Schiffn. & Baumgartner

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[231] *Aloina ambigua* is doubtfully separate from *Aloina aloides*. The differentiating characters are quantitative and overlapping. Molecular work is needed to elucidate further.

[232] Although currently regarded as distinct, there is some evidence to suggest that *Aloina obliquifolia* may be conspecific with *Aloina rigida* (H. Siebel pers. comm. 2017).

[233] Other European species of *Barbula* were moved to the reinstated genera *Hydrogonium* and *Streblotrichum* and the newly described genus *Gymnobarbula* by Kučera et al. (2013).

[234] *Bryoerythrophyllum duellii* was described by Blockeel et al. (2017), and is known from Greece, Crete and Cyprus.

[235] The treatment of Hedderson and Zander (2008) is followed for *Chenia*.

[236] *Chenia ruigtevleia* is a South African species (Hedderson and Zander 2008) recently identified from Spain (Ellis et al. 2016). Further work is needed to confirm that the Spanish and South African material are actually conspecific.

3 ***C. fontinaloides*** (Hedw.) P.Beauv.
4 ***C. riparius*** (Host ex Brid.) Arn. [*Cinclidotus confertus* Lüth] [237]
5 ***C. vivesii*** Ederra

78 ***Crossidium*** Jur.
1 ***C. aberrans*** Holz. & E.B.Bartram
2 ***C. crassinervium*** (De Not.) Jur.
3 ***C. davidai*** Catches.
4 ***C. geheebii*** (Broth.) Broth.
5 ***C. laevipilum*** Thér. & Trab. [238]
6 ***C. laxefilamentosum*** W.Frey & Kürschner [239]
7 ***C. squamiferum*** (Viv.) Jur.
a var. ***pottioideum*** (De Not.) Mönk. [240]
b var. ***squamiferum***

79 ***Dialytrichia*** (Schimp.) Limpr.
1 ***D. mucronata*** (Brid.) Broth.
2 ***D. saxicola*** (Lamy) M.J.Cano [*Dialytrichia fragilifolia* (Bizot & J.Roux) F.Lara] [241]

80 ***Didymodon*** Hedw. [*Aithobryum* R.H.Zander, *Exobryum* R.H.Zander, *Fuscobryum* R.H.Zander, *Geheebia* Schimp., *Trichostomopsis* Cardot, *Vinealobryum* R.H.Zander][242]
1 ***D. acutus*** (Brid.) K.Saito
2 ***D. asperifolius*** (Mitt.) H.A.Crum, Steere & L.E.Anderson [*Exobryum asperifolium* (Mitt.) R.H.Zander]
3 ***D. australasiae*** (Hook. & Grev.) R.H.Zander [*Trichostomopsis australasiae* (Hook. & Grev.) H.Rob.]
4 ***D. bistratosus*** Hébr. & R.B.Pierrot [*Aithobryum bistratosum* (Hébr. & R.B.Pierrot) R.H.Zander]
5 ***D. brachyphyllus*** (Sull.) R.H.Zander [*Didymodon lamyanus* (Schimp.) Thér., *Vinealobryum brachyphyllum* (Sull.) R.H. Zander] [243]
6 ***D. cordatus*** Jur. [*Vinealobryum cordatum* (Jur.) R.H.Zander]
7 ***D. eckeliae*** R.H.Zander [*Vinealobryum eckeliae* (R.H.Zander) R.H.Zander] [244]
8 ***D. fallax*** (Hedw.) R.H.Zander [*Geheebia fallax* (Hedw.) R.H.Zander]

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[237] Recent molecular work has shown *Cinclidotus confertus* to be identical with *C. riparius* (M. Lüth pers. comm. 2017).
[238] *Crossidium laevipium* is doubtfully morphologically separable from *Crossidium crassinervium,* but molecular data (Kučera et al. in prep.) confirms its identity.
[239] *Crossidium laxefilamentosum* is doubtfully separable from *Crossidium crassinervium*.
[240] *Crossidium squamiferum* var. *pottioideum* is doubtfully separable from var. *squamiferum*.
[241] The combination *Dialytrichia saxicola*, which has priority over *Dialytrichia fragilifolia*, was made by Cano (2007).
[242] The segregation of *Aithobryum, Exobryum*, *Fuscobryum, Geheebia, Trichostomopsis* and *Vinealobryum*, proposed by Zander (2013, 2019), is essentially unnecessary or unsupported by molecular phylogenetic analyses.
[243] Jiménez (2006) revised the European species of *Didymodon* and synonymised *Didymodon lamyanus* with *Didymodon brachyphyllus*.
[244] *Didymodon eckeliae* was ***r***eported new to Europe by Puche et al. (2006). European plants are morphologically similar to American ones, but preliminary molecular work by J. Kučera shows that they do not belong to the same lineages. The identity of the European plants therefore remains problematic.

9 ***D. ferrugineus*** (Schimp. ex Besch.) M.O.Hill [*Geheebia ferruginea* (Schimp. ex Besch.) R.H.Zander]
10 ***D. giganteus*** (Funck) Jur. [*Geheebia gigantea* (Funck) Boulay]
11 ***D. glaucus*** Ryan
  a subsp. ***glaucus***
  b subsp. ***verbanus*** (W.E.Nicholson & Dixon) Jan Kučera [*Didymodon verbanus* (W.E.Nicholson & Dixon) Loeske] [245]
12 ***D. icmadophilus*** (Schimp. ex Müll.Hal.) K.Saito
13 ***D. insulanus*** (De Not.) M.O.Hill [*Vinealobryum insulanum* (De Not.) R.H.Zander]
14 ***D. johansenii*** (R.S.Williams) H.A.Crum [*Exobryum johansenii* (R.S.Williams) R.H.Zander]
15 ***D. luridus*** Hornsch. [*Vinealobryum luridum* (Hornsch.) R.H.Zander]
16 ***D. maschalogenus*** (Renauld & Cardot) Broth. [246]
17 ***D. maximus*** (Syed & Crundw.) M.O.Hill
18 ***D. nicholsonii*** Culm. [*Vinealobryum nicholsonii* (Culm.) R.H.Zander]
19 ***D. rigidulus*** Hedw.
20 ***D. sinuosus*** (Mitt.) Delogne [*Vinealobryum sinuosum* (Mitt.) R.H.Zander]
21 ***D. spadiceus*** (Mitt.) Limpr. [*Geheebia spadicea* (Mitt.) R.H.Zander]
22 ***D. subandreaeoides*** (Kindb.) R.H.Zander [*Fuscobryum subandreaeoides* (Kindb.) R.H.Zander]
23 ***D. tomaculosus*** (Blockeel) M.F.V.Corley
24 ***D. tophaceus*** (Brid.) Lisa [*Geheebia tophacea* (Brid.) R.H.Zander] [247]
  a subsp. ***erosus*** (J.A.Jiménez & J.Guerra) Jan Kučera [*Didymodon erosus* J.A.Jiménez & J.Guerra]
  b subsp. ***sicculus*** (M.J.Cano, Ros, García-Zam. & J.Guerra) Jan Kučera [*Didymodon sicculus* M.J.Cano, Ros, García-Zam. & J.Guerra]
  c subsp. ***tophaceus***
    i. var. ***anatinus*** Hamm.
    ii. var. ***tophaceus***
25 ***D. umbrosus*** (Müll.Hal.) R.H.Zander [*Trichostomopsis umbrosa* (Müll.Hal.) H.Rob.]
26 ***D. validus*** Limpr. [248]
27 ***D. vinealis*** (Brid.) R.H.Zander [*Vinealobryum vineale* (Brid.) R.H. Zander]

81 ***Hennediella*** Paris
1 ***H. heimii*** (Hedw.) R.H.Zander [*Desmatodon wilczekii* Meyl., *Tortula rhodonia* R.H.Zander] [249]
  a var. ***arctica*** (Lindb.) R.H.Zander [250]
  b var. ***heimii***

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[245] *Didymodon verbanus* is a problematic taxon recorded in Europe from Switzerland, Austria, Italy and Germany. It is probably best recognised as a subspecies of *Didymodon glaucus*, so the new combination is proposed above.
[246] *Didymodon maschalogenus* was reported new to Europe by Köckinger and van Melick (2007).
[247] The treatment of *Didymodon tophaceus* and its infraspecific classification, including the reduction of *Didymodon erosus* and *Didymodon sicculus* to subspecies, follows Kučera et al. (2018).
[248] Jiménez (2006) clarified the status of *Didymodon validus*, which was not listed by Hill et al. (2006).
[249] *Tortula rhodonia* was synonymised with *Hennediella heimii* by Cano (2008). *Tortula rhodonia* is a replacement name for *Desmatodon wilczekii*, but all possible type specimens seem to have been lost. Therefore a neotypification of *Desmatodon wilczekii* is necessary in order to complete the synonymisation.
[250] *Hennediella heimii* var. *arctica* probably has little or no value but is retained for the present.

2 ***H. macrophylla*** (R.Br.bis) Paris
3 ***H. stanfordensis*** (Steere) Blockeel

82 ***Hilpertia*** R.H.Zander
1 ***H. velenovskyi*** (Schiffn.) R.H.Zander

83 ***Leptodontium*** (Müll.Hal.) Hampe
1 ***L. flexifolium*** (Dicks.) Hampe
2 ***L. gemmascens*** (Mitt.) Braithw.
3 ***L. proliferum*** Herzog [251]
4 ***L. styriacum*** (Jur.) Limpr. [252]

84 ***Microbryum*** Schimp.
1 ***M. curvicollum*** (Hedw.) R.H.Zander
2 ***M. davallianum*** (Sm.) R.H.Zander [253]
a var. ***commutatum*** (Limpr.) R.H.Zander [*Pottia commutata* Limpr.] [254]
b var. ***conicum*** (Schleich. ex Schwägr.) R.H.Zander [*Pottia conica* (Schleich. ex Schwägr.) Fürnr., *Pottia starckeana* subsp. *conica* (Schleich. ex Schwägr.) D.F.Chamb.]
c var. ***davallianum***
3 ***M. floerkeanum*** (F.Weber & D.Mohr) Schimp.
4 ***M. fosbergii*** (E.B.Bartram) Ros, O.Werner & Rams
5 ***M. longipes*** (J.Guerra J.J.Martínez & Ros) R.H.Zander
6 ***M. rectum*** (With.) R.H.Zander
7 ***M. starckeanum*** (Hedw.) R.H.Zander
8 ***M. vlassovii*** (Laz.) R.H.Zander [*Phascum vlassovii* Laz., *Tortula vlassovii* (Laz.) Ros & Herrnst.] [255]

85 ***Pseudocrossidium*** R.S.Williams [256]
1 ***P. hornschuchianum*** (Schultz) R.H.Zander
2 ***P. obtusulum*** (Lindb.) H.A.Crum & L.E.Anderson
3 ***P. replicatum*** (Taylor) R.H.Zander

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[251] *Leptodontium proliferum* is a Southern Hemisphere species that was reported from a single site in England by Porley and Edwards (2010). No further localities have been discovered, but plants with characters intermediate between this species and *L. gemmascens* have been found at another site in England (Blockeel 2017). The identity of the English material of *Leptodontium proliferum* requires further study.

[252] *Leptodontium styriacum* has been synonymised with *Leptodontium flexifolium* (Ignatov et al. 2005), but it appears that *Leptodontium flexifolium* has an Atlantic distribution, whereas *Leptodontium styriacum* has a continental one. Morphological differences between them are very small and further work is necessary to clarify the stiuation.

[253] The variability of *Microbryum davallianum* has not been satisfactorily clarified. Ros et al. (1996) argued for the full synonymy of the earlier recognised varieties but no molecular data have been presented so far to support this view. In view of the mostly distinct morphologies and occasional mixed occurrences, as well as their geographical ranges, which do not fully overlap, they are retained at varietal rank pending final taxonomic clarification.

[254] There are sufficient morphological differences to recognise *Microbryum davallianum* var. *commutatum* at varietal level, and the same applies to *Microbryum davallianum* var. *conicum*.

[255] *Microbryum vlassovii* was included in *Phascum* by Hill et al. (2006) but placed in *Tortula* by Ros et al. (2013). However, its reddish coloration with KOH suggests that it may be more correctly placed in *Microbryum*.

[256] Preliminary molecular studies by J. Kučera suggest that what has been recognised as *Pseudocrossidium obtusulum* and also the European records of *Pseudocrossidium replicatum* may prove to be *Pseudocrossidium hornschuchianum*, but until a complete revision is done, both species are retained.

4 ***P. revolutum*** (Brid.) R.H.Zander

86 ***Pterygoneurum*** Jur.
1 ***P. kozlovii*** Laz.
2 ***P. lamellatum*** (Lindb.) Jur.
3 ***P. ovatum*** (Hedw.) Dixon [*Pterygoneurum compactum* M.J.Cano, J.Guerra & Ros, *Pterygoneurum crossidioides* W.Frey, Herrnst. & Kürschner, *Pterygoneurum squamosum* Segarra & Kürschner] [257]
4 ***P. papillosum*** Oesau
5 ***P. sampaianum*** (Guim.) Guim.
6 ***P. subsessile*** (Brid.) Jur.

87 ***Stegonia*** Venturi
1 ***S. latifolia*** (Schwägr.) Venturi ex Broth.
a var. ***latifolia***
b var. ***pilifera*** (Brid.) Broth. [258]

88 ***Syntrichia*** Brid.
1 ***S. bogotensis*** (Hampe) R.H.Zander
2 ***S. calcicola*** J.J.Amann
3 ***S. caninervis*** Mitt.
a var. ***abranchesii*** (Luisier) R.H.Zander
b var. ***astrakhanica*** Ignatov, Ignatova & Suragina
c var. ***caninervis***
d var. ***gypsophila*** (J.J.Amann ex G.Roth) Ochyra
4 ***S. echinata*** (Schiffn.) Herrnst. & Ben-Sasson
5 ***S. fragilis*** (Taylor) Ochyra
6 ***S. handelii*** (Schiffn.) S.Agnew & Vondr.
7 ***S. laevipila*** Brid. [*Syntrichia pagorum* (Milde) J.J.Amann] [259]
8 ***S. latifolia*** (Bruch ex Hartm.) Huebener
9 ***S. minor*** (Bizot) M.T.Gallego, J.Guerra, M.J.Cano, Ros & Sánchez-Moya
10 ***S. montana*** Nees [*Syntrichia intermedia* Bridel]
a var. ***calva*** (Durieu & Sagot ex Bruch & Schimp.) J.J.Amann
b var. ***montana***
11 ***S. norvegica*** F.Weber
12 ***S. papillosa*** (Wilson) Jur.
13 ***S. papillosissima*** (Copp.) Loeske
14 ***S. princeps*** (De Not.) Mitt.
15 ***S. rigescens*** (Broth. & Geh.) Ochyra
16 ***S. ruraliformis*** (Besch.) Mans. [*Syntrichia ruralis* var. *ruraliformis* (Besch.) Delogne] [260]
17 ***S. ruralis*** (Hedw.) F.Weber & D.Mohr [*Syntrichia densa* (Velen.) J.-P.Frahm, *Syntrichia glabra* J.-P.Frahm & M.T.Gallego] [261]

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[257] Synonymies of *Pterygoneurum ovatum* follow Guerra et al. 2006. However, this treatment is not yet supported by molecular data.

[258] *Stegonia latifolia* var. *pilifera* is reinstated because it appears to be a distinctive and stable taxon, albeit differing from the type in only a single character, the excurrent costa.

[259] S*yntrichia pagorum* (Milde) J.J.Amann, listed as a synonym *of Syntrichia laevipila* by Hill et al. (2006), may prove to be a good species, but more work is needed (Afonina et al. 2014).

[260] Molecular and morphological evidence suggest that *Syntrichia ruraliformis* should be regarded as a species (Hedenäs et al. 2019).

a var. ***epilosa*** (Venturi) J.J.Amann [262]
b var. ***ruralis***

18 ***S. sinensis*** (Müll.Hal.) Ochyra
19 ***S. submontana*** (Broth.) Ochyra [263]
20 ***S. subpapillosissima*** (Bizot & R.B.Pierrot ex W.A.Kramer) M.T.Gallego & J.Guerra [264]
21 ***S. virescens*** (De Not.) Ochyra

89 ***Tortula*** Hedw. [*Desmatodon* Brid., *Phascum* Hedw., *Pottia* Ehrh. ex Fürnr.]
1 ***T. acaulon*** (With.) R.H.Zander [*Phascum cuspidatum* Hedw.][265]
a var. ***acaulon*** [*Phascum cuspidatum* var. *cuspidatum*]
b var. ***papillosa*** (Lindb.) R.H.Zander [*Phascum cuspidatum* var. *papillosum* (Lindb.) G.Roth]
c var. ***pilifera*** (Hedw.) R.H.Zander [*Phascum cuspidatum* var. *piliferum* (Hedw.) Hook. & Taylor]
d var. ***retortifolia*** (J.Guerra & Ros) R.H.Zander [*Phascum cuspidatum* var. *retortifolium* J.Guerra & Ros]
e var. ***schreberiana*** (Dicks.) R.H.Zander [*Phascum cuspidatum* var. *schreberianum* (Dicks.) Brid.]
2 ***T. amplexa*** (Lesq.) Steere [*Syntrichia amplexa* (Lesq.) R.H.Zander]
3 ***T. ampliretis*** Crundw. & D.G.Long
4 ***T. atrovirens*** (Sm.) Lindb.
5 ***T. bogosica*** (Müll.Hal.) R.H.Zander [*Desmatodon bogosicus* Müll.Hal.]
6 ***T. bolanderi*** (Lesq. & James) M.Howe
7 ***T. brevissima*** Schiffn.
8 ***T. canescens*** Mont.
9 ***T. caucasica*** Broth. [*Pottia intermedia* (Turner) Fürnr., *Tortula modica* R.H.Zander] [266]
10 ***T. cernua*** (Huebener) Lindb.
11 ***T. cuneifolia*** (Dicks.) Turner
12 ***T. freibergii*** Dixon & Loeske
13 ***T. guepinii*** (Bruch & Schimp.) Broth. [*Desmatodon guepinii* Bruch & Schimp.]
14 ***T. hoppeana*** (Schultz) Ochyra [*Desmatodon latifolius* (Hedw.) Brid.]
15 ***T. inermis*** (Brid.) Mont.
16 ***T. israelis*** Bizot & F.Bilewsky [*Tortula baetica* (Casas & R.Oliva) J.Guerra & Ros]
17 ***T. laureri*** (Schultz) Lindb. [*Desmatodon laureri* (Schultz) Bruch & Schimp.]

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[261] According to Frahm and Sabovljević (2006), *Syntrichia glabra* is a juvenile form of *Syntrichia densa* (Velen.) J.-P.Frahm. *Syntrichia densa* was synonymised with *Syntrichia calcicola* by Gallego et al. (2002), but Kramer (1980) synonymised *Tortula densa* with *Tortula ruralis*. The latter synonymy is followed here.

[262] *Syntrichia ruralis* var. *epilosa* was resurrected by Gallego et al. (2018). It may represent a special phenotype within *Syntrichia ruraliformis* or *Syntrichia ruralis* but more study is required (Hedenäs et al. 2019).

[263] *Syntrichia submontana* is essentially a central Asian species recorded from the Caucasus (Afonina et al. 2014).

[264] *Syntrichia subpapillosissima* may represent a special phenotype within *Syntrichia ruraliformis* or *Syntrichia ruralis* but more study is required (Hedenäs et al. 2019).

[265] We follow the treatment of Ros et al. (2013) and refer the species included in *Phascum* by Hill et al. (2006) to *Tortula*.

[266] *Tortula modica* was synonymised with *Tortula caucasica* by Ros et al. (2008).

18 ***T. leucostoma*** (R.Br.) Hook. & Grev. [*Desmatodon leucostoma* (R.Br.) Berggr.]
19 ***T. lindbergii*** Broth. [*Pottia lanceolata* (Hedw.) Müll.Hal., *Tortula lanceola* R.H.Zander] [267]
20 ***T. lingulata*** Lindb.
21 ***T. marginata*** (Bruch & Schimp.) Spruce [*Desmatodon meridionalis* Luisier]
22 ***T. mucronifolia*** Schwägr.
23 ***T. muralis*** Hedw.
  a subsp. ***muralis*** [268]
    i. var. ***aestiva*** Hedw.
    ii. var. ***muralis***
  b subsp. ***obtusifolia*** (Schwägr.) Culm. [*Tortula obtusifolia* (Schwägr.) Mathieu] [269]
24 ***T. pallida*** (Lindb.) R.H.Zander
25 ***T. protobryoides*** R.H.Zander [*Protobryum bryoides* (Dicks.) J.Guerra & M.J.Cano] [270]
26 ***T. randii*** (Kenn.) R.H.Zander [*Desmatodon randii* (Kenn.) Laz.)]
27 ***T. revolvens*** (Schimp.) G.Roth
28 ***T. schimperi*** M.J.Cano, O.Werner & J.Guerra [*Tortula subulata* var. *angustata* (Schimp.) Limpr.]
29 ***T. solmsii*** (Schimp.) Limpr.
30 ***T. subulata*** Hedw. [*Tortula subulata* var. *graeffii* Warnst., *Tortula subulata* var. *subinermis* (Bruch & Schimp.) Wilson]
31 ***T. systylia*** (Schimp.) Lindb. [*Desmatodon systylius* Schimp.]
32 ***T. truncata*** (Hedw.) Mitt.
33 ***T. ucrainica*** (Laz.) R.H.Zander [*Desmatodon ucrainicus* Laz.]
34 ***T. vahliana*** (Schultz) Mont.
35 ***T. viridifolia*** (Mitt.) Blockeel & A.J.E.Sm. [*Pottia crinita* Bruch & Schimp.]
36 ***T. wilsonii*** (Hook.) R.H.Zander

90 ***Triquetrella*** Müll.Hal.
  1 ***T. arapilensis*** Luisier

Streblotrichoideae Y.Inoue & H.Tsubota [271]

91 ***Streblotrichum*** P.Beauv. [272]
  1 ***S. convolutum*** (Hedw.) P.Beauv. [*Barbula convoluta* Hedw.]
    a var. ***commutatum*** (Jur.) J.J.Amann [*Barbula convoluta* var. *sardoa* Schimp., *Streblotrichum commutatum* (Jur.) Hilp.] [273]
    b var. ***convolutum***
  2 ***S. enderesii*** (Garov.) Loeske [*Barbula enderesii* Garov.]

Trichostomoideae Broth.

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[267] *Tortula lanceola* was synonymised with *Tortula lindbergii* by Ros et al. (2008).
[268] The two varieties of *Tortula muralis* subsp. *muralis* intergrade but there is a certain level of distinctness, so this treatment follows Košnar and Kolář (2009).
[269] Košnar and Kolář 2009 reduced *Tortula obtusifolia* to a subspecies of *Tortula muralis*.
[270] We follow the treatment of Ros et al. (2013) for *Tortula protobryoides*.
[271] The subfamily Streblotrichoideae was proposed by Inoue and Tsubota (2016).
[272] *Streblotrichum* was re-established on molecular evidence by Kučera et al. (2013).
[273] *Streblotrichum convolutum* var. *commutatum* is retained at varietal rank. Although it is not always morphologically distinct, molecular evidence clearly separates the two taxa (Kučera et al. 2013).

92 *Anoectangium* Schwägr.
- 1 ***A. aestivum*** (Hedw.) Mitt.
- 2 ***A. angustifolium*** Mitt. [274]
- 3 ***A. handelii*** Schiffn.

93 ***Aschisma*** Lindb.
- 1 ***A. carniolicum*** (F.Weber & D.Mohr) Lindb.
- 2 ***A. cuynetii*** (Bizot & R.B.Pierrot) J.Guerra & M.J.Cano

94 ***Chionoloma*** Dixon [*Oxystegus* (Limpr.) Hilp.] [275]
- 1 ***C. bombayense*** (Müll.Hal.) P.Sollman [*Pseudosymblepharis bombayensis* (Müll.Hal.) P.Sollman] [276]
- 2 ***C. daldinianum*** (De Not.) M.Alonso, M.J.Cano & J.A.Jiménez [*Oxystegus daldinianus* (De Not.) Köckinger, O.Werner & Ros] [277]
- 3 ***C. hibernicum*** (Mitt.) M.Alonso, M.J.Cano & J.A.Jiménez [*Oxystegus hibernicus* (Mitt.) Hilp., *Trichostomum hibernicum* (Mitt.) Dixon]
- 4 ***C. minus*** (Köckinger, O.Werner & Ros) M.Alonso, M.J.Cano & J.A.Jiménez [*Oxystegus minor* Köckinger, O.Werner & Ros] [278]
- 5 ***C. recurvifolium*** (Taylor) M.Alonso, M.J.Cano & J.A.Jiménez [*Oxystegus recurvifolius* (Taylor) R.H.Zander, *Paraleptodontium recurvifolium* (Taylor) D.G.Long, *Trichostomum recurvifolium* (Taylor) R.H.Zander]
- 6 ***C. tenuirostre*** (Hook. & Taylor) M.Alonso, M.J.Cano & J.A.Jiménez [*Oxystegus tenuirostris* (Taylor) R.H.Zander]
  - a var. ***holtii*** (Braithw.) M.Alonso, M.J.Cano & J.A.Jiménez [*Oxystegus tenuirostris* var. *holtii* (Braithw.) A.J.E.Sm.]
  - b var. ***tenuirostre***

95 ***Ephemerum*** Hampe [279]
- 1 ***E. cohaerens*** (Hedw.) Hampe
- 2 ***E. crassinervium*** (Schwägr.) Hampe [280]
  - a subsp. ***rutheanum*** (Schimp.) Holyoak [*Ephemerum hibernicum* Holyoak & V.S.Bryan, *Ephemerum rutheanum* Schimp. in Ruthe, *Ephemerum serratum* var. *rutheanum* (Schimp.) Jur.]
  - b subsp. ***sessile*** (Bruch) Holyoak [*Ephemerum sessile* (Bruch) Müll.Hal.]

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[274] Unpublished molecular work by J. Kučera shows *Anoectangium angustifolium* to be distinct from *Anoectangium aestivum*.

[275] While *Oxystegus* is a molecularly well-delimited group, retaining it leaves problems, notably in the delimitation of *Pseudosymblepharis* Broth. Therefore, we follow Alonso et al. (2016) in placing these species in *Chionoloma*.

[276] *Chionoloma bombayense*, recorded in Europe from the Caucasus, is retained in the checklist for the present, following Ignatova et al. (2012). However, Alonso et al. (2018) circumscribe *Chionoloma bombayense* in a much narrower sense, leaving many other plants in *Chionoloma bombayense s.lat*, including the Caucasus plant, without a name.

[277] Originally described as *Didymodon cylindricus* var. *daldinianus* De Not., *Chionoloma daldinianum* was treated in various ways historically, including being omitted altogether by Hill et al. (2006); it was resurrected as a species with molecular support by Köckinger et al. (2010), then brought into *Chionoloma* by Alonso et al. (2016).

[278] *Chionoloma minus* was described as a new species by Köckinger et al. (2010), then brought into *Chionoloma* by Alonso et al. (2016). However, significant doubts remain about its distinctiveness as a species: in north-western Europe it intergrades morphologically with *Chionoloma hibernicum*.

[279] All recent phylogenies (e.g. Werner et al. 2005) agree in placing *Ephemerum* within the Trichostomoideae rather than its own family, however strange this may seem morphologically.

[280] The treatment of *Ephemerum crassinervium* and related taxa follows Holyoak (2010).

3 ***E. recurvifolium*** (Dicks.) Boulay
4 ***E. serratum*** (Hedw.) Hampe [*Ephemerum minutissimum* Lindb., *Ephemerum serratum* var. *minutissimum* (Lindb.) Grout] [281]
5 ***E. spinulosum*** Bruch & Schimp. ex Schimp.
6 ***E. stoloniferum*** (Hedw.) L.T.Ellis & M.J.Price [*Ephemerum serratum* auct., *Ephemerum stellatum* H.Philib.][282]

96 ***Eucladium*** Bruch & Schimp.
1 ***E. verticillatum*** (With.) Bruch & Schimp. [*Eucladium verticillatum* var. *angustifolium* Lindb] [283]

97 ***Gymnobarbula*** Jan Kučera [284]
1 ***G. bicolor*** (Bruch & Schimp.) Jan Kučera [*Barbula bicolor* (Bruch & Schimp.) Lindb.]

98 ***Gymnostomum*** Nees & Hornsch.
1 ***G. aeruginosum*** Sm.
a var. ***aeruginosum***
b var. ***obscurum*** J.Guerra
2 ***G. calcareum*** Nees & Hornsch. [*Gymnostomum calcareum* var. *lanceolatum* Sérgio, *Gymnostomum lanceolatum* M.J.Cano, Ros & J.Guerra] [285]
a var. ***atlanticum*** Sérgio [286]
b var. ***calcareum***
3 ***G. viridulum*** Brid.

99 ***Gyroweisia*** Schimp.
1 ***G. reflexa*** (Brid.) Schimp.
2 ***G. tenuis*** (Hedw.) Schimp.

100 ***Hydrogonium*** (Müll.Hal.) A.Jaeger [*Ardeuma* R.H.Zander & Hedd.] [287]
1 ***H. amplexifolium*** (Mitt.) P.C.Chen [*Barbula amplexifolia* (Mitt.) A.Jaeger] [288]
2 ***H. bolleanum*** (Müll.Hal.) A.Jaeger [*Barbula bolleana* (Müll.Hal.) Broth.]
3 ***H. consanguineum*** (Thwaites & Mitt.) Hilp. [*Barbula consanguinea* (Thwaites & Mitt.) A.Jaeger] [289]
a var. ***kurilense*** (Ignatova & Ignatov) Jan Kučera [290]

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[281] As a consequence of lectotypification, *Ephermerum minutissimum* Lindb. was placed in synonymy with *Ephemerum serratum* (Hedw.) Hampe (Ellis and Price 2015)
[282] *Ephemerum stellatum* was synonymised with *Ephemerum serratum* by Holyoak (2010). Subsequently, Ellis and Price (2015) lectotypified *E. stoloniferum* and showed that it was the correct name for the large-spored taxon previously treated under the name *E. serratum*.
[283] *Eucladium verticillatum* var. *angustifolium* is regarded as nothing more than a form of the type.
[284] *Gymnobarbula* was established as a new genus by Kučera et al. (2013).
[285] *Gymnostomum lanceolatum* was reduced to a variety of *Gymnostomum calcareum* by Sérgio (2006). We treat it as a synonym, as it appears to be merely a form of that species.
[286] *Gymnostomum calcareum* var. *atlanticum* was described by Sérgio (2006). On molecular evidence, it is a well-marked variety that may be sufficiently distinct to be elevated to specific status.
[287] *Hydrogonium* was re-established on molecular evidence by Kučera et al. (2013).
[288] *Barbula amplexifolia* was reported new to Europe by Köckinger and Kučera (2007) and transferred to *Hydrogonium* by Kučera et al. (2013).
[289] *Hydrogonium consanguineum* was earlier reported from Europe as *Barbula indica*; Köckinger et al. (2012) proved that these reports belong to *Barbula consanguinea*, transferred to *Hydrogonium* by Kučera et al. (2013).
[290] The European expression of *Hydrogonium consanguineum* is var. *kurilense;* var. *consanguineum* occurs in Asia; var. *cancellatum* (Müll.Hal.) Jan Kučera is a North American plant (Kučera et al. 2013).

4 ***H. croceum*** (Brid.) Jan Kučera [*Barbula crocea* (Brid.) F.Weber & D.Mohr]

101 ***Hymenostylium*** Brid. [*Ardeuma* R.H.Zander & Hedd.] [291]
- 5 ***H. gracillimum*** (Nees & Hornsch.) Köckinger & Jan Kučera [*Gymnostomum boreale* Nyholm & Hedenäs] [292]
- 6 ***H. recurvirostrum*** (Hedw.) Dixon [*Gymnostomum recurvirostrum* Hedw.]
  - a var. ***insigne*** (Dixon) E.B.Bartram [*Ardeuma annotinum* (Mitt. ex Dixon) R.H. Zander & Brinda, *Ardeuma insigne* (Dixon) R.H.Zander & Hedd., *Hymenostylium insigne* (Dixon) Podp.]
  - b var. ***recurvirostrum*** [*Ardeuma recurvirostrum* (Hedw.) R.H.Zander & Hedd.]
- 7 ***H. xerophilum*** Köckinger & Jan Kučera[293]

102 ***Hyophila*** Brid.
- 1 ***H. involuta*** (Hook.) A.Jaeger

103 ***Leptobarbula*** Schimp.
- 1 ***L. berica*** (De Not.) Schimp.

104 ***Molendoa*** (Müll.Hal.) Hampe
- 1 ***M. hornschuchiana*** (Hook.) Lindb. ex Limpr. [*Anoectangium hornschuchianum* (Hook.) Funck ex Hornsch., *Anoectangium sendtnerianum* Bruch & Schimp., *Molendoa sendtneriana* (Bruch & Schimp.) Limpr., *Molendoa tenuinervis* Limpr.] [294]
- 2 ***M. schliephackei*** (Schlieph.) R.H.Zander [*Anoectangium schliephackii* (Schlieph.) Paris]
- 3 ***M. taeniatifolia*** Herzog [*Anoectangium taeniatifolium* (Herzog) M.O.Hill]
- 4 ***M. warburgii*** (Crundw. & M.O.Hill) R.H.Zander [*Anoectangium warburgii* (Limpr.) Paris]

105 ***Pottiopsis*** Blockeel & A.J.E.Sm.
- 1 ***P. caespitosa*** (Brid.) Blockeel & A.J.E.Sm. [*Trichostomum triumphans* De Not., *Weissia triumphans* (De Not.) M.O.Hill, *Weissia tyrrhena* M.Fleisch.] [295]

106 ***Splachnobryum*** Müll.Hal.
- 1 ***S. obtusum*** (Brid.) Müll.Hal.

107 ***Tortella*** (Müll.Hal.) Limpr. [*Pleurochaete* Lindb.]
- 1 ***T. alpicola*** Dixon
- 2 ***T. x cuspidatissima*** (Cardot & Thér.) O.Werner, Köckinger & Ros [*Tortella arctica* auct., non (Arnell) Crundw. & Nyholm] [296]

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[291] The transfer of most *Hymenostylium* species, including *Hymenostylium recurvirostrum* and its varieties, to *Ardeuma* (Zander and Hedderson 2016) is not supported according to molecular evidence (Kučera in prep.).

[292] The position of *Hymenostylium gracillimum* and the synonymy of *Gymnostomum boreale* were clarified by Köckinger and Kučera (2011).

[293] *Hymenostylium xerophilum* was described from Austria as a new species by Köckinger and Kučera (2011). It has since been found in Germany and Crimea.

[294] Geissler (1995) proposed the synonymy of *Molendoa sendtneriana* and *Molendoa tenuinervis* with *Molendoa hornschuchiana*. This is followed here, as it is supported by preliminary molecular results by J. Kučera.

[295] The position of *Pottiopsis caespitosa* and its synonymies were clarified by Ros and Werner (2007). However, *Trichostomum/Weissia triumphans* is a distinctive form, and continues to be recognised by many bryologists.

3 ***T. densa*** (Lorentz & Molendo) Crundw. & Nyholm [*Tortella inclinata* var. *densa* (Lorenz & Molendo) Limpr.]
4 ***T. fasciculata*** (Culm.) Culm. [*Tortella bambergeri* auct., non (Schimp.) Broth. p.p., *Tortella tortuosa* subsp. *fasciculata* Culm.] [297]
5 ***T. flavovirens*** (Bruch) Broth. [*Tortella limosella* (Stirt.) P.W.Richards & E.C.Wallace] [298]
a var. ***flavovirens***
b var. ***glareicola*** (T.A.Chr.) Crundw. & Nyholm
c var. ***papillosissima*** Sérgio & Casas
6 ***T. fragilis*** (Drumm.) Limpr. [299]
7 ***T. humilis*** (Hedw.) Jenn.
8 ***T. inclinata*** (R.Hedw.) Limpr.
9 ***T. inflexa*** (Bruch) Broth.
10 ***T. limbata*** (Schiffn.) Geh. & Herzog
11 ***T. mediterranea*** Köckinger, Lüth, O.Werner & Ros [300]
12 ***T. nitida*** (Lindb.) Broth.
13 ***T. pseudofragilis*** (Thér.) Köckinger & Hedenäs [*Tortella bambergeri* auct., non (Schimp.) Broth. p.p., *Tortella fragilis* var. *moravica* Podp.] [301]
14 ***T. rigens*** Alberts.
15 ***T. spitsbergensis*** (Bizot & Thér.) O.Werner, Köckinger & Ros [*Trichostomum arcticum* Kaal.] [302]
16 ***T. squarrosa*** (Brid.) Limpr. [*Pleurochaete squarrosa* (Brid.) Lindb.] [303]
17 ***T. tortuosa*** (Hedw.) Limpr. [*Tortella bambergeri* (Schimp.) Broth.] [304]

108 ***Trichostomum*** Bruch.
1 ***T. brachydontium*** Bruch
2 ***T. crispulum*** Bruch

109 ***Weissia*** Hedw.

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[296] Werner et al. (2014) used molecular techniques to show that *Tortella* x *cuspidatissima* was of hybrid origin, with *Tortella arctica* and *Tortella spitsbergensis* as parents. *Tortella arctica* itself does not occur in Europe. The record of *Tortella arctica* from Jämtland in Sweden (Ellis et al. 2011) proved, according to the molecular data, to be a form of *Tortella tortuosa* (Köckinger and Hedenäs 2017).

[297] *Tortella fasciculata* was resurrected by Köckinger and Hedenäs (2017) as part of their revision of *Tortella bambergeri*.

[298] Further studies on *Tortella limosella* are necessary to determine the final position of *Tortella limosella* within *Tortella flavovirens*.

[299] The authorship of *Tortella fragilis* was discussed in Ochyra et al. (2008). The name should correctly be ascribed to Drummond.

[300] *Tortella mediterranea* was described from southern Europe by Köckinger et al. (2018).

[301] The name *Tortella pseudofragilis* was introduced by Köckinger and Hedenäs (2017) as part of their revision of *Tortella bambergeri*.

[302] The identity and relationships of *Tortella spitsbergensis* were clarified by Werner et al. (2014) using molecular techniques.

[303] We follow Ros et al. (2013) in accepting Werner et al. (2005) and Grundmann et al. (2006), who include *Pleurochaete squarrosa* within the genus *Tortella*.

[304] Using morphological and molecular methods, Köckinger and Hedenäs (2017) demonstrated that the type of *Tortella bambergeri* was synonymous with *Tortella tortuosa*. Plants recently treated as *Tortella bambergeri* are referable to *Tortella fasciculata* and *Tortella pseudofragilis*. Up to now, the acceptance of *Tortella tortuosa* var. *fragilifolia* (Jur.) Limpr. has been based on the treatment of Eckel (1998), but this concept is based on plants later referred to *Tortella bambergeri* (Eckel 2010). In general, the name 'var. *fragilifolia*' has been used for morphs of *Tortella tortuosa* with fragile leaves, and the variety is therefore not included in the checklist.

1 ***W. angustifolia*** (Baumgartner) D.A.Callaghan [*Weissia longifolia* var. *angustifolia* (Baumgartner) Crundw. & Nyholm] [305]
2 ***W. brachycarpa*** (Nees & Hornsch.) Jur.
3 ***W. condensa*** (Voit) Lindb.
  a var. ***armata*** (Thér. & Trab.) M.J.Cano, Ros & J.Guerra
  b var. ***condensa***
4 ***W. controversa*** Hedw.
  a var. ***controversa***
  b var. ***crispata*** (Nees & Hornsch.) Nyholm
  c var. ***densifolia*** (Bruch & Schimp.) Wilson [306]
5 ***W. levieri*** (Limpr.) Kindb.
6 ***W. longifolia*** Mitt.
7 ***W.* x *mittenii*** (Bruch & Schimp.) Mitt. emend. A.J.E.Sm. [307]
8 ***W. perssonii*** Kindb.
9 ***W. rostellata*** (Brid.) Lindb.
10 ***W. rutilans*** (Hedw.) Lindb.
11 ***W. squarrosa*** (Nees & Hornsch.) Müll.Hal.
12 ***W. sterilis*** W.E.Nicholson
13 ***W. wilsonii*** D.A.Callaghan [*Weissia multicapsularis* auct.] [308]
14 ***W. wimmeriana*** (Sendtn.) Bruch & Schimp.

Grimmiales M.Fleisch.

Saelaniaceae Ignatov & Fedosov [309]

110 ***Saelania*** Lindb.
  1 ***S. glaucescens*** (Hedw.) Broth.

Seligeriaceae Schimp.

111 ***Blindia*** Bruch & Schimp.
  1 ***B. acuta*** (Hedw.) Bruch & Schimp.
  2 ***B. caespiticia*** (F.Weber & D.Mohr) Müll.Hal.

112 ***Blindiadelphus*** (Lindb.) Fedosov & Ignatov [*Seligeria* Bruch & Schimp. subgenus *Blindiadelphus* Lindb.] [310]
  1 ***B. campylopodus*** (Kindb.) Fedosov & Ignatov [*Seligeria campylopoda* Kindb.]
  2 ***B. diversifolius*** (Lindb.) Fedosov & Ignatov [*Seligeria diversifolia* Lindb.]
  3 ***B. polaris*** (Berggr.) Fedosov & Ignatov [*Seligeria polaris* Berggr.]

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[305] *Weissia longifolia* var. *angustifolia* was raised to species level by Callaghan et al. (2019) on the basis of morphological and molecular evidence.
[306] *Weissia controversa* var. *densifolia* is retained as a variety for now, but it is very doubtfully distinct from var. *controversa*, and significantly less so than var. *crispata*.
[307] Smith (2004) was the first to propose that *Weissia* x *mittenii* was a hybrid, and this was accepted by Hill et al. (2006). The name was later typified by Callaghan (2019).
[308] *Weissia wilsonii* was newly described by Callaghan et al. (2019) to replace the taxon which was named *Weissia multicapsularis* (Sm.) Mitt. by modern authors. The type of the latter refers to *Tortula acaulon*, into which plants of *Weissia longifolia* were admixed.
[309] Molecular studies by Fedosov et al. (2016a) showed that *Saelania* is best placed in its own family within the Grimmiales.
[310] *Blindiadelphus* was segregated from *Seligeria* on the basis of morphological and molecular evidence (Fedosov et al. 2017c).

4 ***B. recurvatus*** (Hedw.) Fedosov & Ignatov [*Seligeria recurvata* (Hedw.) Bruch & Schimp.]
5 ***B. subimmersus*** (Lindb.) Fedosov & Ignatov [*Seligeria subimmersa* Lindb.]

113 ***Seligeria*** Bruch & Schimp.
Subgenus *Seligeria*
1 ***S. acutifolia*** Lindb.
2 ***S. brevifolia*** (Lindb.) Lindb.
3 ***S. calcarea*** (Hedw.) Bruch & Schimp.
4 ***S. calycina*** Mitt. ex Lindb. [*Seligeria paucifolia* auct. non (With.) Carruth.]
5 ***S. donniana*** (Sm.) Müll.Hal. [*Seligeria galinae* Mogensen & I.Goldberg] [311]
6 ***S. pusilla*** (Hedw.) Bruch & Schimp.
Subgenus *Megalosporia* Vitt
7 ***S. austriaca*** T.Schauer
8 ***S. carniolica*** (Breidl. & Beck) Nyholm [*Trochobryum carniolicum* Breidl. & Beck]
9 ***S. irrigata*** (H.K.G.Paul) Ochyra & Gos
10 ***S. oelandica*** C.E.O.Jensen & Medelius
11 ***S. patula*** (Lindb.) I.Hagen [*Seligeria alpestris* T.Schauer, *Seligeria patula* var. *alpestris* (T.Schauer) Gos & Ochyra, *Seligeria tristichoides* var. *patula* (Lindb.) Broth.]
12 ***S. trifaria*** (Brid.) Lindb.
a var. ***longifolia*** (Lindb. ex Broth.) Ochyra & Gos [312]
b var. ***trifaria***
13 ***S. tristichoides*** Kindb.

Ptychomitriaceae Schimp.

114 ***Brachydontium*** Fürnr. [313]
1 ***B. trichodes*** (F.Weber) Milde [*Seligeria transylvanica* Plam.]

115 ***Campylostelium*** Bruch & Schimp.
1 ***C. pitardii*** (Corb.) E.Maier [*Grimmia pitardii* Corb.]
2 ***C. saxicola*** (F.Weber & D.Mohr) Bruch & Schimp.
3 ***C. strictum*** Solms

116 ***Indusiella*** Broth. & Müll.Hall.
1 ***I. thianschanica*** Broth. & Müll.Hal.

117 ***Jaffueliobryum*** Thér.
1 ***J. latifolium*** Lindb. & Arnell ex Thér.

118 ***Ptychomitrium*** Fürnr.
1 ***P. incurvum*** (Schwägr.) Spruce
2 ***P. nigrescens*** (Kunze) Wijk & Margad.
3 ***P. polyphyllum*** (Dicks. ex Sw.) Bruch & Schimp.

Grimmiaceae Arn.
Racomitrioideae Ochyra & Bedn.-Ochyra

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[311] *Seligeria galinae* was synonymised with *Seligeria donniana* by Fedosov et al. (2017c).
[312] *Seligeria trifaria* var. *longifolia* was not mentioned in Hill et al. (2006) but is regarded as a distinct taxon in the central European mountains (Ochyra and Gos 1992).
[313] Molecular evidence places *Brachydontium* in the Ptychomitriaceae (Fedosov et al. 2017a).

119 ***Racomitrium*** Brid. [*Bucklandiella* Roiv., *Codriophorus* P.Beauv., *Niphotrichum* Bedn.-Ochyra & Ochyra] [314]

Subgenus *Racomitrium*

1 ***R. lanuginosum*** (Hedw.) Brid.

Subgenus *Niphotrichum* Bedn.-Ochyra [*Niphotrichum* (Bedn.-Ochyra) Bedn.-Ochyra & Ochyra]

2 ***R. canescens*** (Hedw.) Brid. [*Niphotrichum canescens* (Hedw.) Bedn.-Ochyra & Ochyra]

a subsp. ***canescens***

b subsp. ***latifolium*** (C.E.O.Jensen) Frisvoll [*Niphotrichum canescens* subsp. *latifolium* (Frisvoll) Bedn.-Ochyra & Ochyra]

3 ***R. elongatum*** Ehrh. ex Frisvoll

4 ***R. ericoides*** (Brid.) Brid. [*Niphotrichum ericoides* (Brid.) Bedn.-Ochyra & Ochyra]

5 ***R. panschii*** (Müll.Hal.) Kindb. [*Niphotrichum panschii* (Müll.Hal.) Bedn.-Ochyra & Ochyra]

Subgenus *Cataracta* Vilh. [*Codriophorus* P.Beauv., *Dilutineuron* Bedn.-Ochyra, Sawicki, Ochyra, Szczecińska & Plášek]

6 ***R. aciculare*** (Hedw.) Brid. [*Codriophorus acicularis* (Hedw.) P.Beauv.]

7 ***R. aquaticum*** (Brid. ex Schrad.) Brid. [*Codriophorus aquaticus* (Brid. ex Schrad.) Bedn.-Ochyra & Ochyra]

8 ***R. fasciculare*** (Hedw.) Brid. [*Codriophorus fascicularis* (Hedw.) Bedn.-Ochyra & Ochyra, *Dilutineuron fasciculare* (Hedw.) Bedn.-Ochyra, Sawicki, Ochyra, Szczecińska & Plášek]

9 ***R. hespericum*** Sérgio, J.Muñoz & Ochyra [*Codriophorus hespericus* (Sérgio, J.Muñoz & Ochyra) Bedn.-Ochyra & Ochyra]

Subgenus *Ellipticodryptodon* (Vilh.) Bedn.-Ochyra & Ochyra [*Bucklandiella* Roiv.]

10 ***R. affine*** (F.Weber & D.Mohr) Lindb. [*Bucklandiella affinis* (J.Muñoz & Ochyra) Bedn.-Ochyra & Ochyra]

11 ***R. ellipticum*** (Turner) Bruch & Schimp. [*Bucklandiella elliptica* (Turner) Bedn.-Ochyra & Ochyra]

12 ***R. heterostichum*** (Hedw.) Brid. [*Bucklandiella heterosticha* (Hedw.) Bedn.-Ochyra & Ochyra]

13 ***R. himalayanum*** (Mitt.) A.Jaeger [*Bucklandiella himalayana* (Mitt.) Bedn.-Ochyra & Ochyra]

14 ***R. lamprocarpum*** (Müll.Hal.) A.Jaeger [*Bucklandiella lamprocarpa* (Müll.Hal.) Bedn.-Ochyra & Ochyra]

15 ***R. lusitanicum*** Ochyra & Sérgio [*Bucklandiella lusitanica* (Ochyra & Sérgio) Bedn.-Ochyra & Ochyra]

16 ***R. macounii*** Kindb. [*Bucklandiella macounii* (Kindb.) Bedn.-Ochyra & Ochyra]

a subsp. ***alpinum*** (E.Lawton) Frisvoll [*Bucklandiella macounii* subsp. *alpina* (E.Lawton) Bedn.-Ochyra & Ochyra]

b subsp. ***macounii***

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[314] The treatment of *Racomitrium* follows Larraín et al. (2013), who used molecular evidence for a broad treatment of the genus.Sawicki et al. (2015) used mitochondrial DNA to support narrower genera. However, they used only ten species of *Racomitrium* s.lat. (two from each segregate genus), and the results did not contradict the previous treatment. Indeed, significant problems remain (e.g. *Bucklandiella* sensu Ochyra is not monophyletic) and until *Racomitrium* s.lat. is more completely treated, we prefer to retain *Racomitrium* in a broad sense.

17 ***R. microcarpon*** (Hedw.) Brid. [*Bucklandiella microcarpa* (Hedw.) Bedn.-Ochyra & Ochyra]
18 ***R. nivale*** (Köckinger, Bedn.-Ochyra & Ochyra) Köckinger [*Bucklandiella nivalis* Köckinger, Bedn.-Ochyra & Ochyra][315]
19 ***R. obtusum*** (Brid.) Brid. [*Bucklandiella obtusa* (Brid.) Bedn.-Ochyra & Ochyra]
20 ***R. sudeticum*** (Funck) Bruch & Schimp. [*Bucklandiella sudetica* (Funck) Bedn.-Ochyra & Ochyra]

Grimmioideae Broth.

120 ***Coscinodon*** Spreng.
1 ***C. cribrosus*** (Hedw.) Spruce [*Grimmia cribrosa* Hedw.]
2 ***C. horridus*** (Muñoz & H.Hespanhol) Hugonnot, R.D.Porley & Ignatov [*Grimmia horrida* Muñoz & H.Hespanhol] [316]
3 ***C. humilis*** Milde [317]
4 ***C. monchiquensis*** R.D.Porley, Ochyra & Ignatova [318]

121 ***Grimmia*** Hedw. [*Dryptodon* Brid., *Guembelia* Hampe in Müll.Hal., *Hydrogrimmia* (I.Hagen) Loeske, *Orthogrimmia* (Schimp.) Ochyra & Żarnowiec, *Streptocolea* (I.Hagen) Ochyra & Żarnowiec] [319]
1 ***G. alpestris*** (F.Weber & D.Mohr) Schleich. [*Orthogrimmia alpestris* (F.Weber & D.Mohr) Ochyra & Żarnowiec]
2 ***G. anodon*** Bruch & Schimp.
3 ***G. anomala*** Hampe ex Schimp.
4 ***G. arenaria*** Hampe [*Orthogrimmia arenaria* (Hampe) Ochyra & Żarnowiec][320]
5 ***G. atrata*** Miel. ex Hornsch. [*Streptocolea atrata* (Miel. ex Hornsch.) Ochyra & Żarnowiec]
6 ***G. caespiticia*** (Brid.) Jur. [*Orthogrimmia caespiticia* (Brid.) Ochyra & Żarnowiec]
7 ***G. capillata*** De Not. [321]
8 ***G. crinita*** Brid.
9 ***G. crinitoleucophaea*** Cardot [*Grimmia poecilostoma* Cardot & Sebille] [322]

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[315] Described as *Bucklandiella nivalis* by Köckinger et al. (2007) but listed as *Racomitrium nivale* by Köckinger et al. (2008).

[316] *Grimmia horrida* was described by Muñoz et al. (2009), and transferred to *Coscinodon* by Hugonnot et al. (2018).

[317] A molecular study by Ignatova et al. (2008) showed that *Coscinodon humilis* is a European endemic known only from the Alps, whereas plants with this name in east Asia belong to *Coscinodon yukonensis* Hastings.

[318] *Coscinodon monchiquensis* was described from the Algarve, Portugal, by Ignatov et al. (2018).

[319] Although Ochyra et al. (2003) presented a morphological scheme comprising seven distinct genera, based largely on the traditional subgenera of *Grimmia*, we choose to treat it in the broad sense. There is molecular support for the paraphyletic nature of *Grimmia* (Streiff 2006; Hernández-Maqueda et al. 2008, but there remain some significant incongruities between plastid and nuclear ITS and the morphological schemes. The evolutionary history of *Grimmia* is complex and further sampling and better phylogenetic markers are needed.

[320] *Grimmia arenaria* was synonymised with *Grimmia donniana* by Maier (2010) but treated as a distinct species in Muñoz et al. (2015). Molecular investigations indicate that it should be accepted as a species (D. Callaghan, pers. comm. 2019).

[321] *Grimmia capillata* was synonymised with *G. crinita* by Maier (2010) but this view has not gained acceptance, since molecular studies support it at specific level. It is recognised at species level in Muñoz et al. (2015).

10 ***G. curviseta*** Bouman [323]
11 ***G. decipiens*** (Schultz) Lindb.
12 ***G. dissimulata*** E.Maier
13 ***G. donniana*** Sm. [*Orthogrimmia donniana* (Sm.) Ochyra & Żarnowiec]
14 ***G. elatior*** Bruch ex Bals.-Criv. & De Not.
15 ***G. elongata*** Kaulf.
16 ***G. funalis*** (Schwägr.) Bruch & Schimp.
17 ***G. fuscolutea*** Hook.
18 ***G. hartmanii*** Schimp.
19 ***G. incurva*** Schwägr.
20 ***G. laevigata*** (Brid.) Brid. [*Guembelia laevigata* (Brid.) Ochyra & Żarnowiec]
21 ***G. lisae*** De Not.
22 ***G. longirostris*** Hook. [*Guembelia longirostris* (Hook.) Ochyra & Żarnowiec]
23 ***G. meridionalis*** (Müll.Hall.) E.Maier [*Grimmia trichophylla* var. *meridionalis* Müll.Hall.] [324]
24 ***G. mollis*** Bruch & Schimp. [*Hydrogrimmia mollis* (Bruch & Schimp.) Loeske]
25 ***G. montana*** Bruch & Schimp. [*Orthogrimmia montana* (Bruch & Schimp.) Ochyra & Żarnowiec]
26 ***G. muehlenbeckii*** Schimp.
27 ***G. nutans*** Bruch [*Grimmia meteorae* C.C.Towns.]
28 ***G. orbicularis*** Bruch ex Wilson [*Dryptodon orbicularis* (Bruch ex Wilson) Ochyra & Żarnowiec]
29 ***G. ovalis*** (Hedw.) Lindb. [*Guembelia ovalis* (Hedw.) Müll.Hal.]
30 ***G. plagiopodia*** Hedw.
31 ***G. pulvinata*** (Hedw.) Sm.
32 ***G. ramondii*** (Lam. & DC.) Margad. [*Dryptodon patens* (Hedw.) Brid., *Grimmia curvata* (Brid.) De Sloover]
33 ***G. reflexidens*** Müll.Hal. [*Grimmia sessitana* De Not., *Orthogrimmia sessitana* (De Not.) Ochyra & Żarnowiec] [325]
34 ***G. teretinervis*** Limpr.
35 ***G. tergestina*** Tomm. ex Bruch & Schimp. [*Grimmia tergestina* var. *tergestinoides* (Culm.) Podp., *Guembelia tergestina* (Tomm. ex Bruch & Schimp.) Buyss.] [326]
36 ***G. torquata*** Drumm.
37 ***G. trichophylla*** Grev. [*Grimmia britannica* A.J.E.Sm.]
38 ***G. triformis*** Carestia & De Not. [*Orthogrimmia triformis* (Carestia & De Not.) Ochyra & Żarnowiec] [327]

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[322] *Grimmia poecilostoma* was synonymised with *Grimmia crinitoleucophaea* by Muñoz et al. (2015). However, the synonymy of *G. crinitoleucophaea* with *Grimmia tergestina* (Maier 2010) has not been widely accepted, on morphological grounds.

[323] *Grimmia curviseta* was synonymised with *G. orbicularis* by Maier (2010) but this is disputed; Rodríguez-Romero et al. (2016) used DNA sequencing to conclude that it is an allopolyploid derivative with *G. orbicularis* as one of its progenitors.

[324] *Grimmia meridionalis* was elevated to the rank of species by Maier (2002), but, unlike *Grimmia dissimulata*, not accepted by Hill et al. (2006). However, its status as a species has subsequently been supported by molecular evidence (Streiff 2006).

[325] Taxonomic, nomenclatural and misidentification issues surround *Grimmia reflexidens*. The situation in Europe remains unresolved but we retain *Grimmia reflexidens* for the present.

[326] *Grimmia tergestina* var. *tergestinoides* seems distinct in central Europe. More work is needed to determine its taxonomic value.

[327] *Grimmia triformis* was synonymised with *Grimmia donniana* by Maier (2010) but differs in several respects, and was accepted as a species by Muñoz et al. (2015).

39 ***G. ungeri*** Jur. [328]
40 ***G. unicolor*** Hook.

122 ***Schistidium*** Bruch & Schimp.
1 ***S. abrupticostatum*** (Bryhn) Ignatova & H.H.Blom [*Schistidium platyphyllum* var. *abrupticostatum* (Bryhn) H.H.Blom] [329]
2 ***S. agassizii*** Sull. & Lesq.
3 ***S. andreaeopsis*** (Müll.Hal.) Laz. [330]
4 ***S. apocarpum*** (Hedw.) Bruch & Schimp.
5 ***S. atrichum*** (Müll.Hal. & Kindb.) W.A.Weber [331]
6 ***S. atrofuscum*** (Schimp.) Limpr.
7 ***S. boreale*** Poelt
8 ***S. brunnescens*** Limpr.
a subsp. ***brunnescens***
b subsp. ***griseum*** (Nees & Hornsch.) H.H.Blom
9 ***S. bryhnii*** I.Hagen
10 ***S. canadense*** (Dupr.) Ignatova & H.H.Blom [332]
11 ***S. confertum*** (Funck) Bruch & Schimp.
12 ***S. confusum*** H.H.Blom
13 ***S. convergens*** J.Guerra & M.J.Cano [333]
14 ***S. crassipilum*** H.H.Blom
15 ***S. crenatum*** H.H.Blom
16 ***S. dupretii*** (Thér.) W.A.Weber
17 ***S. echinatum*** Ignatova & H.H.Blom [334]
18 ***S. elegantulum*** H.H.Blom
a subsp. ***elegantulum***
b subsp. ***wilsonii*** H.H.Blom
19 ***S. flaccidum*** (De Not.) Ochyra
20 ***S. flexipile*** (Lindb. ex Broth.) G.Roth
21 ***S. frigidum*** H.H.Blom
a var. ***frigidum***
b var. ***havaasii*** H.H.Blom
22 ***S. frisvollianum*** H.H.Blom
23 ***S. grande*** Poelt
24 ***S. grandirete*** H.H.Blom

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[328] *Grimmia ungeri* was listed as a synonym of *Grimmia montana* by Maier (2010). Muñoz and Pando (2000) listed *Grimmia ungeri* from several countries, including Spain and Italy, but it was not included by Muñoz et al. (2015). Specimens from Mexico were redetermined as *Grimmia montana* (Delgadillo-Moya 2015). On the other hand, it differs from *Grimmia montana* in some respects (J. Muñoz, pers. comm. 2017). Although we retain it in the checklist for now, *Grimmia ungeri* is taxonomically dubious and may ultimately prove to be synonymous with *Grimmia montana*.

[329] *Schistidium abrupticostatum* is not very close to *Schistidium platyphyllum* according to molecular studies by Ignatova et al. (2010).

[330] *Schistidium andreaeopsis* is an Asian Arctic species recorded more recently from the European Arctic (Blom et al. 2006).

[331] *Schistidium atrichum* is a principally North American species with occurrences in France reported by Chavoutier and Hugonnot (2013).

[332] *Schistidium canadense* is a North American species with a single European record from Russia (Karelia) (Ignatova et al. 2010).

[333] *Schistidium convergens* was recently described as a new species from southern Spain and Morocco (Guerra et al. 2019).

[334] *Schistidium echinatum* was described from Russia by Ignatova et al. (2010), and has also now been found in France and Austria.

25 ***S. helveticum*** (Schkuhr) Deguchi [*Schistidium singarense* (Schiffn.) Laz.]
26 ***S. holmenianum*** Steere & Brassard
27 ***S. lancifolium*** (Kindb.) H.H.Blom
28 ***S. marginale*** H.H.Blom, Bedn.-Ochyra & Ochyra [335]
29 ***S. maritimum*** (Sm. ex R.Scott) Bruch & Schimp.
   a subsp. ***maritimum***
   b subsp. ***piliferum*** (I.Hagen) B.Bremer
30 ***S. obscurum*** H.H.Blom, Köckinger & Ignatova [336]
31 ***S. occidentale*** (E.Lawton) S.P.Churchill
32 ***S. papillosum*** Culm.
33 ***S. platyphyllum*** (Mitt.) H.Perss.
34 ***S. poeltii*** H.H.Blom
35 ***S. pruinosum*** (Wilson ex Schimp.) G.Roth
36 ***S. pulchrum*** H.H.Blom
37 ***S. recurvum*** H.H.Blom
38 ***S. rivulare*** (Brid.) Podp.
39 ***S. robustum*** (Nees & Hornsch.) H.H.Blom
40 ***S. scandicum*** H.H.Blom
41 ***S. sibiricum*** Ignatova & H.H.Blom [337]
42 ***S. sinensiapocarpum*** (Müll.Hal.) Ochyra [338]
43 ***S. sordidum*** I.Hagen
44 ***S. spinosum*** H.H.Blom & Lüth
45 ***S. strictum*** (Turner) Loeske ex Mårtensson
46 ***S. subconfertum*** (Broth.) Deguchi [339]
47 ***S. subflaccidum*** (Kindb.) H.H.Blom [340]
48 ***S. subjulaceum*** H.H.Blom
49 ***S. submuticum*** H.H.Blom
   a subsp. ***arcticum*** H.H.Blom
   b subsp. ***submuticum***
50 ***S. succulentum*** Ignatova & H.H.Blom [341]
51 ***S. tenerum*** (J.E.Zetterst.) Nyholm
52 ***S. tenuinerve*** Ignatova & H.H.Blom [342]
53 ***S. trichodon*** (Brid.) Poelt
   a var. ***nutans*** H.H.Blom
   b var. ***trichodon***
54 ***S. umbrosum*** (J.E.Zetterst.) H.H.Blom
55 ***S. venetum*** H.H.Blom

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[335] *Schistidium marginale* was described from Austria by Blom et al. (2016), and has since been found in several montane regions in Europe.
[336] *Schistidium obscurum* was described from Austria by Ignatova et al. 2010. Elsewhere in Europe it has also been found in Switzerland, the Caucasus and Svalbard.
[337] *Schistidium sibiricum* was described from Russia by Ignatova et al. (2010).
[338] *Schistidium sinensiapocarpum* was first reported in Europe from the Caucasus (Blom et al. 2006), and also occurs in the Austrian Alps (Köckinger et al. 2008).
[339] *Schistidium subconfertum* is primarily an Asian species. However, a herbarium specimen was recently discovered from the Italian Alps (Italy: Stilfserjochhöhe, 26 August 1909, Glowacki, GJO), and examined by H. Blom. This species is here published new to Europe.
[340] *Schistidium subflaccidum* was reported from the Caucasus in Russia (Blom et al. 2006), and has subsequently been found in mountainous regions of other parts of Europe.
[341] *Schistidium succulentum* was described from Russia by Ignatova et al. (2010).
[342] *Schistidium tenuinerve* was described from Asiatic Russia (Ignatova et al. 2010), but was recently also recorded from European Russia (E. Ignatova pers. comm. 2018).

Version Today

Hedwigiales Ochyra

Hedwigiaceae Schimp.

123 ***Braunia*** Bruch & Schimp. [*Hedwigidium* Bruch & Schimp.]
- 1 ***B. alopecura*** (Brid.) Limpr.
- 2 ***B. imberbis*** (Sm.) N.Dalton & D.G.Long [*Hedwigidium integrifolium* auct., non (P.Beauv.) Dixon, *Hedwigia integrifolia* auct., non P.Beauv.] [343]

124 ***Hedwigia*** P.Beauv.
- 1 ***H. ciliata*** (Hedw.) P.Beauv.
- 2 ***H. emodica*** Hampe ex Müll.Hal. [*Hedwigia ciliata* var. *leucophaea* Bruch & Schimp.)] [344]
- 3 ***H. mollis*** Ignatova, Ignatov & Fedosov [345]
- 4 ***H. nemoralis*** Ignatova, Ignatov & Fedosov [346]
- 5 ***H. stellata*** Hedenäs
- 6 ***H. striata*** (Bruch & Schimp.) John Whitehead & Fergusson ex Hobk. & Porritt [347]

Bartramiales D.Quandt, N.E.Bell & M.Stech

Bartramiaceae Schwägr.
Conostomoideae D.G.Griffin & W.R.Buck

125 ***Conostomum*** Sw.
- 1 ***C. tetragonum*** (Hedw.) Lindb.

Bartramioideae D.G.Griffin & W.R.Buck

126 ***Anacolia*** Schimp.
- 1 ***A. menziesii*** (Turner) Paris
- 2 ***A. webbii*** (Mont.) Schimp.

127 ***Bartramia*** Hedw.

section Bartramia
- 1 ***B. halleriana*** Hedw.
- 2 ***B. pomiformis*** Hedw.

section *Pyridium* Müll.Hal.
- 3 ***B. breviseta*** Lindb.
- 4 ***B. ithyphylla*** Brid.
- 5 ***B. subulata*** Bruch & Schimp.

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[343] Dalton et al. (2012) found that European specimens identified as *Hedwigidium integrifolium* differed from the type material of *Hedwigia integrifolia* P.Beauv., and were considered to belong to *Braunia imberbis*. De Luna (2016) reported that *Braunia imberbis*, along with some other (non-European) species, group together in a different clade, *Hedwigidium*. Until further research is done on this group, the species is here retained in *Braunia*.

[344] Hedenäs (1994) suggested that *Hedwigia emodica* was a synonym of *Hedwigia ciliata* var. *leucophaea*. Buchbender et al. (2014) later proved the hybrid origin of some accessions referable to this taxon. Ignatova et al. (2016) recognised the taxon at species level, as *Hedwigia emodica*, but doubts persist that all European material is the same as the plants from Russia (or the Himalayan type of *Hedwigia emodica*).

[345] Ignatova et al. (2016) described *Hedwigia mollis* as part of their study of the genus in Russia.

[346] *Hedwigia nemoralis* was described from Russia by Ignatova et al. (2016).

[347] *Hedwigia striata* was a neglected taxon returned to specific rank by Buchbender et al. (2014).

section *Strictidium* Müll.Hal.
6 ***B. aprica*** Müll.Hal. [*Bartramia rosamrosiae* Damayanti, J.Muñoz, J.-P.Frahm & D.Quandt, *Bartramia stricta* auct. eur., non Brid.] [348]
7 ***B. laevisphaera*** (Taylor) Müll.Hal. [*Anacolia laevisphaera* (Taylor) Flowers] [349]

128 ***Plagiopus*** Brid.
1 ***P. oederianus*** (Sw.) H.A.Crum & L.E.Anderson
a var. ***alpinus*** (Schwägr.) Ochyra [350]
b var. ***oederianus***

Breutelioideae D.G.Griffin & W.R.Buck

129 ***Breutelia*** (Bruch & Schimp.) Schimp.
1 ***B. azorica*** (Mitt.) Cardot
2 ***B. chrysocoma*** (Hedw.) Lindb.

130 ***Philonotis*** Brid.
section *Bartramidula* (Bruch & Schimp.) Mitt.
1 ***P. cernua*** (Wilson) D.G.Griffin & W.R.Buck
section *Philonotula* (Schimp.) A.Jaeger
2 ***P. rigida*** Brid.
section *Homomorphae* (Kindb.) Ochyra
3 ***P. capillaris*** Lindb. [*Philonotis arnellii* Husn.] [351]
4 ***P. falcata*** (Hook.) Mitt. [352]
5 ***P. hastata*** (Duby) Wijk & Margad.
6 ***P. marchica*** (Hedw.) Brid.
7 ***P. uncinata*** (Schwägr.) Brid.
section *Philonotis*
8 ***P. caespitosa*** Jur.
9 ***P. calcarea*** (Bruch & Schimp.) Schimp.
10 ***P. fontana*** (Hedw.) Brid.
11 ***P. seriata*** Mitt.
12 ***P. tomentella*** Molendo
13 ***P. yezoana*** Besch. & Cardot [353]

Splachnales Ochyra

Splachnaceae Grev. & Arn.
Taylorioideae Broth.

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[348] Damayanti et al. (2012) described *Bartramia rosamrosiae* for the European plants after finding that *Bartramia stricta* was restricted to South America. This was synonymised with *Bartramia aprica* by Müller (2014). However, recent (as yet unpublished) work by Neumann, Muñoz and Quandt suggests that *Bartramia aprica* and *Bartramia rosamrosiae* are indeed distinct species.

[349] Molecular analysis revealed that *Bartramia laevisphaera* belongs to *Bartramia* section *Strictidium* rather than to *Anacolia* (Damayanti et al. 2012).

[350] There is disagreement over the status of *Plagiopus oederianus* var. *alpinus*: it may be nothing more than a high-altitude form of the species, but is retained for the present.

[351] *Philonotis capillaris* is the correct name for this *Philonotis arnellii* (Koponen and Isoviita 2010).

[352] *Philonotis falcata* is an Asian species reported from the Caucasus new to Europe by Ignatov et al. (2010).

[353] *Philonotis yezoana* is an Asian species reported from Finland new to Europe by Ulvinen and Kypärä (2016).

Version Today

131 ***Tayloria*** Hook.
- 1 ***T. acuminata*** Hornsch.
- 2 ***T. froelichiana*** (Hedw.) Mitt. ex Broth.
- 3 ***T. hornschuchii*** (Grev. & Arn.) Broth.
- 4 ***T. lingulata*** (Dicks.) Lindb.
- 5 ***T. rudolphiana*** (Garov.) Bruch & Schimp.
- 6 ***T. serrata*** (Hedw.) Bruch & Schimp.
- 7 ***T. splachnoides*** (Schleich. ex Schwägr.) Hook.
- 8 ***T. tenuis*** (Dicks.) Schimp.

Splachnoideae Broth.

132 ***Aplodon*** R.Br.
- 1 ***A. wormskioldii*** (Hornem.) R.Br.

133 ***Splachnum*** Hedw.
- 1 ***S. ampullaceum*** Hedw.
- 2 ***S. luteum*** Hedw.
- 3 ***S. melanocaulon*** (Wahlenb.) Schwägr.
- 4 ***S. pensylvanicum*** (Brid.) Grout ex H.A.Crum
- 5 ***S. rubrum*** Hedw.
- 6 ***S. sphaericum*** Hedw.
- 7 ***S. vasculosum*** Hedw.

134 ***Tetraplodon*** Bruch & Schimp.
- 1 ***T. angustatus*** (Hedw.) Bruch & Schimp.
- 2 ***T. blyttii*** Frisvoll
- 3 ***T. mnioides*** (Hedw.) Bruch & Schimp.
- 4 ***T. pallidus*** I.Hagen
- 5 ***T. paradoxus*** (R.Br.) I.Hagen
- 6 ***T. urceolatus*** (Hedw.) Bruch & Schimp.

135 ***Voitia*** Hornsch.
- 1 ***V. hyperborea*** Grev. & Arn.
- 2 ***V. nivalis*** Hornsch.

Meesiaceae Schimp.

136 ***Amblyodon*** P.Beauv.
- 1 ***A. dealbatus*** (Hedw.) P.Beauv.

137 ***Leptobryum*** (Bruch & Schimp.) Wilson
- 1 ***L. pyriforme*** (Hedw.) Wilson

138 ***Meesia*** Hedw
- 1 ***M. hexasticha*** (Funck) Bruch
- 2 ***M. longiseta*** Hedw.
- 3 ***M. triquetra*** (L. ex Jolycl.) Ångstr.
- 4 ***M. uliginosa*** Hedw.

139 ***Paludella*** Brid.
- 1 ***P. squarrosa*** (Hedw.) Brid.

Bryales Limpr.

Bryaceae Schwägr. [354]

140 ***Anomobryum*** Schimp.

1 ***A. apiculatum*** (Schwägr.) D. Bell & Holyoak [*Bryum apiculatum* Schwägr., *Gemmabryum apiculatum* (Schwägr.) J.R.Spence & H.P.Ramsay, *Osculatia apiculata* (Schwägr.) Ochyra, Plášek & Bedn.-Ochyra] [355]

2 ***A. concinnatum*** (Spruce) Lindb. [356]

3 ***A. julaceum*** (Schrad. ex P.Gaertn. et al.) Schimp.

4 ***A. lusitanicum*** (I.Hagen in Luisier) Thér.

5 ***A. notarisii*** (Mitt.) D.Bell. & Holyoak [*Brachymenium notarisii* (Mitt.) A.J.Shaw] [357]

141 ***Brachymenium*** Schwägr.

1 ***B. paradoxum*** (Herzog) A.J.Shaw

142 ***Bryum*** Hedw. [358]

1 ***B. argenteum*** Hedw.*

2 ***B. bavaricum*** Warnst. [*Anomobryum bavaricum* (Warnst.) Holyoak & Köckinger]* [359]

3 ***B. blindii*** Bruch & Schimp.

4 ***B. canariense*** Brid. [*Rosulabryum canariense* (Brid.) Ochyra] [360]

5 ***B. caucasicum*** (Schimp. ex Broth.) C.J.Cox & Hedd.*

6 ***B. demaretianum*** Arts [*Gemmabryum demaretianum* (Arts) J.R.Spence, *Osculatia demaretiana* (Arts) Ochyra, Plášek & Bedn.-Ochyra]

7 ***B. dichotomum*** Hedw. [*Gemmabryum barnesii* (J.B.Wood ex Schimp.) J.R.Spence, *Osculatia barnesii* (J.B.Wood ex Schimp.) Ochyra, Plášek & Bedn.-Ochyra, *Osculatia bicolor* (Dicks.) Ochyra, Plášek

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[354] See note on Bryaceae in introduction.

[355] The only confirmed European record of *Bryum apiculatum* appears to be a specimen from Tenerife (leg. E. Bourgeon s.n., BM), which was reidentified by Ochi (1972). That specimen may nevertheless need critical reappraisal since Ochi did not record *B. gemmiparum* which is locally frequent on Tenerife, and there have been no subsequent reports of *B. apiculatum* occurring there. Holyoak (2009) and in Blockeel et al. (2014) identified plants from Cornwall as this species and two additional localities have since been found in the same county. However, data from DNA barcoding markers and preliminary analyses of a substantial genomic dataset place Cornish specimens (Holyoak 09-42 and 07-15) in *Bryum s.str.*, close to *B. dichotomum*, differing markedly from a specimen of *B. apiculatum* from Puerto Rico (R.D. Worthington 35254). The Cornish plants thus represent an undescribed taxon allied to *B. dichotomum*, an account of which is in preparation.

[356] Holyoak and Köckinger (2010) supported treatment of *Anomobryum concinnatum* as a distinct species from *Anomobryum julaceum* based on morphological characters. Data from DNA barcoding markers (D. Bell et al., *in litt*.) has subsequently shown that *Anomobryum concinnatum* and *Anomobryum julaceum* form separate clades.

[357] Recent molecular work has shown that *Brachymenium notarisii* is closely related to *Anomobryum lusitanicum*, and is therefore probably best treated in that genus (D.Bell et al. *in litt.*).

[358] Species with adequate molecular data confirming their position in *Bryum* s.str. are annotated with an asterisk (*). The remaining species lack sufficiently informative data, but there are now relatively few remaining 'orphan' species in *Bryum*, several more having been transferred to *Ptychostomum* or *Imbribryum* on the basis of very recent DNA evidence.

[359] Holyoak and Köckinger (2010) placed *Anomobryum bavaricum* in *Anomobryum* on the basis of morphology, but molecular data places it in *Bryum* s.str. (D.Bell et al., *in litt.*).

[360] Results from DNA barcoding and nuclear genomic datasets (D. Bell et al., *in litt*.) show that *Bryum canariense* does not belong in *Bryum* s.str., but is part of a near-basal clade of Bryaceae allied to *Brachymenium* s.str. and *Leptostomopsis*. However, it is retained in *Bryum* here pending further investigation.

& Bedn.-Ochyra, *Gemmabryum dichotomum* (Hedw.) J.R.Spence & H.P.Ramsay, *Osculatia dichotoma* (Hedw.) Ochyra, Plášek & Bedn.-Ochyra]* [361]

8 ***B. dixonii*** Cardot ex W.E.Nicholson
9 ***B. dyffrynense*** Holyoak*
10 ***B. gemmiferum*** R.Wilczek & Demaret [*Gemmabryum gemmiferum* (R.Wilczek & Demaret) J.R.Spence, *Osculatia gemmifera* (R.Wilczek & Demaret) Ochyra, Plášek & Bedn.-Ochyra]*
11 ***B. gemmilucens*** R.Wilczek & Demaret [*Gemmabryum gemmilucens* (R.Wilczek & Demaret) J.R.Spence, *Osculatia gemmilucens* (R.Wilczek & Demaret) Ochyra, Plášek & Bedn.-Ochyra]*
12 ***B. gemmiparum*** De Not. [*Imbribryum gemmiparum* (De Not.) J.R.Spence]*
13 ***B. kikuyense*** (Broth. & Thér.) N.Pedersen [*Brachymenium philonotula* Broth., *Bryum philonotulum* Hampe nom. inval., non *Bryum philonotula* Müll.Hal.]* [362]
14 ***B. klinggraeffii*** Schimp. [*Gemmabryum klinggraeffii* (Schimp.) J.R.Spence & H.P.Ramsay, *Osculatia klinggraeffii* (Schimp.) Ochyra, Plášek & Bedn.-Ochyra] [363]
15 ***B. marratii*** Hook.f. & Wilson
16 ***B. oblongum*** Lindb. [364]
17 ***B. radiculosum*** Brid. [*Gemmabryum radiculosum* (Brid.) J.R.Spence & H.P. Ramsay, *Osculatia radiculosa* (Brid.) Ochyra, Plášek & Bedn.-Ochyra]*
18 ***B. reyeri*** Breidl. [365]
19 ***B. riparium*** I.Hagen
20 ***B. ruderale*** Crundw. & Nyholm [*Gemmabryum ruderale* (Crundw. & Nyholm) J.R.Spence, *Osculatia ruderalis* (Crundw. & Nyholm) Ochyra, Plášek & Bedn.-Ochyra]*
21 ***B. sauteri*** Bruch & Schimp. [*Osculatia sauteri* (Bruch & Schimp.) Ochyra, Plášek & Bedn.-Ochyra]
22 ***B. valparaisense*** Thér. [*Gemmabryum valparaisense* (Thér.) J.R.Spence, *Osculatia valparaisense* (Thér.) Ochyra, Plášek & Bedn.-Ochyra]
23 ***B. versicolor*** A.Braun ex Bruch & Schimp. [366]
24 ***B. violaceum*** Crundw. & Nyholm [*Gemmabryum violaceum* (Crundw. & Nyholm) J.R.Spence, *Osculatia violacea* (Crundw. & Nyholm) Ochyra, Plášek & Bedn.-Ochyra]*

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[361] *Bryum barnesii* is usually regarded as a distinct species in Central Europe, but many plants and populations intermediate between *Bryum barnesii* and *Bryum dichotomum* occur (Holyoak 2003).

[362] Molecular data show that *Brachymenium philonotula* Broth. should be placed in *Bryum* rather than *Brachymenium*, but since the name *Bryum philonotula* Müll.Hal. (≡ *Pohlia philonotula* (Müll.Hal.) Broth.) had already been used, the valid name for the species becomes *Bryum kikuyense* (Pedersen and Hedenäs 2005).

[363] According to molecular evidence from Holyoak and Pedersen (2007), *Bryum klinggraeffii* could possibly be placed in *Imbribryum* or its own genus, but is retained in *Bryum* for the present.

[364] Preliminary molecular data suggest that *Bryum oblongum* may belong to *Ptychostomum* s. lat, but further study is needed to confirm this.

[365] *Bryum reyeri* is only known from the Eastern Alps of Italy (type), Austria and Germany (Limpricht 1895; Grims 1999; Meinunger & Schröder 2007; Köckinger et al. 2008). Provisional data from a nuclear DNA dataset (D. Bell et al., in litt.) imply it is part of a clade basal to the radiation of *Ptychostomum*, as circumscribed here.

[366] *Bryum versicolor* was included as a synonym of *Bryum dichotomum* by Hill et al. (2006) but this is a widely recognised taxon, so it is reinstated pending further studies.

143 ***Imbribryum*** Pedersen [367]

1 ***I. alpinum*** (Huds. ex With.) N.Pedersen [*Bryum alpinum* Huds. ex With.

2 ***I. mildeanum*** (Jur.) J.R.Spence [*Bryum mildeanum* Jur.]

3 ***I. miniatum*** (Lesq.) J.R.Spence [*Bryum miniatum* Lesq] [368]

4 ***I. muehlenbeckii*** (Bruch & Schimp.) N.Pedersen [*Bryum muehlenbeckii* Bruch & Schimp.] [369]

5 ***I. subapiculatum*** (Hampe) D.Bell & Holyoak [*Bryum subapiculatum* Hampe, *Gemmabryum subapiculatum* (Hampe) J.R.Spence & H.P. Ramsay, *Osculatia subapiculata* (Hampe) Ochyra, Plášek & Bedn.-Ochyra] [370]

6 ***I. tenuisetum*** (Limpr.) D.Bell & Holyoak [*Bryum tenuisetum* Limpr., *Gemmabryum tenuisetum* (Limpr.) J.R.Spence & H.P. Ramsay, *Osculatia tenuiseta* (Limpr.) Ochyra, Plášek & Bedn.-Ochyra] [371]

144 ***Ptychostomum*** Hornsch. [*Plagiobryoides* J.R.Spence, *Plagiobryum* Lindb., *Rosulabryum* J.R.Spence] [372]

1 ***P. arcticum*** (R.Br.) J.R.Spence ex Holyoak & N.Pedersen [*Bryum arcticum* (R.Br.) Bruch & Schimp.]

2 ***P. austriacum*** (Köckinger, Holyoak & Suanjak) D.Bell e& Holyoak [*Bryum austriacum* Köckinger, Holyoak & Suanjak] [373]

3 ***P. bornholmense*** (Wink. & R.Ruthe) Holyoak & N.Pedersen [*Bryum bornholmense* Wink. & R.Ruthe, *Osculatia bornholmensis* (Wink. & R.Ruthe) Ochyra, Plášek & Bedn.-Ochyra, *Rosulabryum bornholmense* (Wink. & Ruthe) J.R.Spence]

4 ***P. calophyllum*** (R.Br.) J.R.Spence [*Bryum calophyllum* R.Br.] [374]

5 ***P. capillare*** (Hedw.) Holyoak & N.Pedersen [*Rosulabryum capillare* (Hedw.) J.R.Spence]

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[367] *Imbribryum* was recognised at generic level by Holyoak and Pedersen (2007), and new molecular data from a substantial nuclear genomic dataset supports this view (D. Bell et al., *in litt.*).

[368] *Imbribryum miniatum* is placed in *Imbribryum* based on molecular data from specimens from both the Faeroes and the U.S.A.

[369] Holyoak (in Hill et al. 2006) synonymised *Bryum muehlenbeckii* with *Bryum alpinum* because it appeared to be only a form resulting from growth underwater or beneath snow, and there are numerous intermediate specimens. However, DNA sequence data for *Imbribryum muehlenbeckii* from three exemplars from different localities define a single clade that is well separated from *Imbribryum alpinum*. Hence, they are regarded here as separate species in which occasional apparent morphological intergradation is due to the occurrence of phenotypes ('expressions') that match the appearance of the other taxon. Additional molecular data suggest that it may be better treated in *Ptychostomum*, but further work is needed before this can be confirmed.

[370] DNA barcode data show *Bryum subapiculatum* strongly supported in a clade with *Imbribryum alpinum* (D. Bell et al., *in litt.*), and it is therefore transferred to *Imbribryum*.

[371] Along with *Bryum subapiculatum*, DNA barcoding places *Bryum tenuisetum* in a clade with *Imbribryum alpinum* (D. Bell et al., *in litt.*), so it is here transferred to *Imbribryum*.

[372] *Ptychostomum* was recognised at generic level by Holyoak and Pedersen (2007). There are no molecular data on the type species of *Rosulabryum*, which is *R. albolimbatum* (Hampe) J.R.Spence from Australia. Recent analyses of a nuclear genomic dataset including for the rather similar *Rosulabryum billarderi* (Schwägr.) J.R.Spence from the Southern Hemisphere (type from Tasmania), based on a specimen from Ecuador, imply that it forms part of *Brachymenium* s.str. Hence, further study is desirable before placing European and N. American species in *Rosulabryum*.

[373] *Bryum austriacum* was described from the Alps by Köckinger et al. (2013). DNA barcode data places it in *Ptychostomum* (D. Bell et al., *in litt.*).

[374] Results from DNA barcoding (D. Bell et al. *in litt.*) show that *Bryum calophyllum* belongs in *Ptychostomum*.

6 ***P. cellulare*** (Hook.) D.Bell & Holyoak [*Bryum cellulare* Hook., *Plagiobryoides cellularis* (Hook. in Schwägr.) J.R.Spence]
7 ***P. cernuum*** (Hedw.) Hornsch. [*Bryum uliginosum* (Brid.) Bruch & Schimp.]
8 ***P. compactum*** Hornsch. [*Bryum algovicum* Sendtn. ex Müll.Hal.]
  a var. ***compactum***
  b var. ***rutheanum*** (Warnst.) Holyoak & N.Pedersen [*Bryum algovicum* var. *rutheanum* (Warnst.) Crundw.]
9 ***P. creberrimum*** (Taylor) J.R.Spence & H.P.Ramsay [*Bryum creberrimum* Taylor]
10 ***P. cryophilum*** (Mårtensson) J.R.Spence [*Bryum cryophilum* Mårtensson] [375]
11 ***P. cyclophyllum*** (Schwägr.) J.R.Spence [*Bryum cyclophyllum* (Schwägr.) Bruch & Schimp.]
12 ***P. demissum*** (Hook.) Holyoak & N.Pedersen [*Plagiobryum demissum* (Hook.) Lindb.]
13 ***P. donianum*** (Grev.) Holyoak & N.Pedersen [*Bryum donianum* Grev., *Rosulabryum donianum* (Grev.) Ochyra]
14 ***P. elegans*** (Nees in Brid.) D.Bell & Holyoak [*Bryum elegans* Nees, *Rosulabryum elegans* (Nees in Brid.) Ochyra] [376]
15 ***P. funkii*** (Schwägr.) J.R.Spence [*Bryum funkii* Schwägr.] [377]
16 ***P. imbricatulum*** (Müll.Hal.) Holyoak & N.Pedersen [*Bryum caespiticium* Hedw., *Gemmabryum caespiticium* (Hedw.) J.R.Spence, *Osculatia caespiticia* (Hedw.) Ochyra, Plášek & Bedn.-Ochyra]
17 ***P. inclinatum*** (Sw. ex Brid.) J.R.Spence [*Bryum archangelicum* Bruch & Schimp., *Ptychostomum archangelicum* (Bruch & Schimp.) J.R.Spence] [378]

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[375] DNA barcoding results place *Bryum cryophilum* in *Ptychostomum* (D. Bell et al., *in litt.*).

[376] Morphological similarities have led authors of numerous floras (e.g. Schimper 1876, Smith 2004, Spence 2014) to place *Bryum elegans* close alongside *Bryum capillare*. Caution induced by lack of molecular data on *elegans* nevertheless prevented Holyoak and Pedersen (2007) transferring the species to *Ptychostomum* alongside *Ptychostomum capillare*, and its treatment in *Bryum* was followed by Ros et al. (2013) and Hodgetts (2015). However, the molecular-phylogenetic study by Guerra et al. (2011) revealed *Bryum elegans* as closer to *Bryum pallescens* (i.e. *Ptychostomum pallescens*) than other Bryaceae they analysed, justifying the new combination that is made here. Newly generated nuclear genomic data also place *elegans* as part of *Ptychostomum* s.lat., but outside the (sub-)clade containing *P. capillare*. Spence (*loc. cit*.) has treated both species within the genus *Rosulabryum*, but Pedersen et al. (2003) and Shaw (2014) noted that species previously attributed by Spence to *Rosulabryum* were placed in two different clades in a phylogenetic tree based on molecular data. For this reason and because of continuing doubts about the affinities of the type species *Rosulabryum albolimbatum*, *Rosulabryum* is treated here as a synonym of the more widely inclusive genus *Ptychostomum.*

[377] Results from DNA barcoding (D. Bell et al., *in litt.*) show that *Bryum funkii* belongs in *Ptychostomum*. The spelling '*funkii*' was used in Index Muscorum, but it was changed to '*funckii*' because it commemorates Heinrich Christian Funck (1771-1839). Although at first sight this appears to be correction of an orthographical error (under ICBN Art. 60.1) and congruent with the orthography of *Marsupella funckii* and *Funckia* named in honour of the same botanist, Funk or Funck himself used both spellings of his name (biographer E. Hertel, pers. comm. to H. Köckinger.), so there is no need to change established usage.

[378] Ochyra et al. (2008) pointed out that "the epithet *inclinatum* is still available for *Ptychostomum imbricatum* when it is considered a member of *Ptychostomum*". Since *Pohlia inclinata* Sw. ex Brid. 1803 is the oldest legitimate name available for the species it must therefore be adopted when the species is transferred to *Ptychostomum*, whereas its usage in *Bryum* was blocked by the later homonym *Bryum inclinatum* (Hedw.) Dicks. of 1801 (now *Distichium inclinatum*). Spence (2005) used the epithet *inclinatum* under *Ptychostomum*, but this new combination was invalid since the basionym was incorrectly cited (contrary to ICBN Art. 33.4). Hence, it was not until publication of Spence (2014)

18 ***P. intermedium*** (Brid.) J.R.Spence [*Bryum intermedium* (Brid.) Blandow] [379]

19 ***P. knowltonii*** (Barnes) J.R.Spence [*Bryum knowltonii* Barnes] [380]

20 ***P. kunzei*** (Hornsch.) J.R. Spence [*Bryum kunzei* Hornsch., *Gemmabryum kunzei* (Hornsch.) J.R.Spence, *Osculatia kunzei* (Hornsch.) Ochyra, Plášek & Bedn.-Ochyra] [381]

21 ***P. longisetum*** (Blandow ex Schwägr.) J.R.Spence [*Bryum longisetum* Blandow ex Schwägr.]

22 ***P. minii*** (Podp. ex Guim.) D.Bell & Holyoak [*Bryum minii* Podp. ex Guim.]

23 ***P. moravicum*** (Podp.) Ros & Mazimpaka [*Bryum moravicum* Podp., *Rosulabryum laevifilum* (Syed) Ochyra]

24 ***P. pallens*** (Sw. ex anon.) J.R.Spence [*Bryum pallens* Sw. ex anon., *Bryum sibiricum* Lindb. & Arnell] [382]

25 ***P. pallescens*** (Schleich. ex Schwägr.) J.R.Spence [*Bryum pallescens* Schleich. ex Schwägr., *Ptychostomum boreale* (F.Weber & D.Mohr) Ochyra & Bedn.-Ochyra] [383]

26 ***P. pseudotriquetrum*** (Hedw.) J.R.Spence & H.P.Ramsay ex Holyoak & N.Pedersen [*Bryum neodamense* Itzigs., *Bryum pseudotriquetrum* (Hedw.) P.Gaertn. et al., *Ptychostomum neodamense* (Itzigs.) J.R.Spence] [384]

a var. ***bimum*** (Schreb.) Holyoak & N.Pedersen [*Bryum pseudotriquetrum* var. *bimum* (Schreb.) Lilj.]

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that *Ptychostomum inclinatum* (Sw. ex Brid.) J.R.Spence was validated in accordance with ICBN Art. 33.4 and Art. 45.1.

[379] The placing of *Bryum intermedium* in *Ptychostomum* is supported by sequence data from DNA barcoding markers (D. Bell et al., *in litt.*).

[380] The placing of *Bryum knowltonii* in *Ptychostomum* is supported by sequence data from DNA barcoding markers (D. Bell et al., *in litt.*).

[381] DNA barcoding results suggest that *Bryum kunzei* should be transferred to *Ptychostomum* (D. Bell et al., *in litt.*).

[382] Zolotov (2007a) regarded *Bryum sibiricum* as possibly ”a good, but very rare species”, with the comment that ”it is rather contrastingly different from *B. pallens* which is relatively little variable in gametophytic characters”, all this on the basis of study of a single specimen placed as *Bryum sibiricum* from Yakutia because it matched the original description well. Zolotov (2007b) noted it as close *Bryum pallens*, but ”differs ... [in the] very narrow leaves”. Zolotov made no mention though of the great variability of *Ptychostomum pallens* revealed in the extensive illustrated monograph of the species by Podpěra (1973), which included the new combination *Bryum pallens* subsp. *sibiricum* (Lindb. & Arnell) Podp. (p. 195), redescribed in detail. Other forms of *Bryum pallens* with long narrow leaves and excurrent costa were figured and described in Podpěra's work, including subsp. *prosboreum* Podp. (from arctic Sweden), subsp. *acutiusculum* Podp. (Alaska) and forma *gracile* Podp. (Bohemia), as well as other infraspecific taxa intermediate between these and normal *Ptychostomum pallens*.

[383] Ochyra & Bednarek-Ochyra (2011) demonstrated that *Hypnum boreale* F.Weber & D.Mohr, 1807, and the subsequent combination *Bryum boreale* (F.Weber & D.Mohr) Funck, 1808, are older names for *Ptychostomum pallescens* than *Bryum pallescens* Schwägr., 1816. Ochyra and Bednarek-Ochyra (2015) published a proposal to maintain established usage of the name *Bryum pallescens* in preference to the unfamiliar and largely forgotten name *Bryum boreale* and this desirable initiative is supported here. The combination *Ptychostomum boreale* (F.Weber & D.Mohr) Ochyra & Bednarek-Ochyra, 2011 was valid, and adopted as correct by Ros et al. (2013) and Hodgetts (2015). However, pending the response to the proposal by Ochyra and Bednarek-Ochyra (2015), the established usage should be maintained for *Ptychostomum pallescens*.

[384] *Ptychostomum neodamense* has been shown by Holyoak and Hedenäs (2006), from molecular and other data, to represent an inconstant phenotype of *Ptychostomum pseudotriquetrum* occurring locally in highly calcareous habitats prone to inundation, and connected to it by intermediate forms known widely in Europe and also in Asia, Alaska and Greenland. Its retention at species rank by Spence (2014) is a consequence of an over-emphasis on morphological data.

b var. ***pseudotriquetrum***

27 ***P. rubens*** (Mitt.) Holyoak & N.Pedersen [*Bryum rubens* Mitt., *Osculatia rubens* (Mitt.) Ochyra, Plášek & Bedn.-Ochyra, *Rosulabryum rubens* (Mitt.) J.R.Spence]

28 ***P. salinum*** (I.Hagen ex Limpr.) J.R.Spence [*Bryum salinum* I.Hagen ex Limpr.] [385]

29 ***P. schleicheri*** (DC. in Lam.) J.R.Spence ex D.Bell & Holyoak [*Bryum schleicheri* DC. in Lam.] [386]

a var. ***latifolium*** (Schwägr.) D.Bell & Holyoak (Schwägr.) Schimp. [*Bryum schleicheri* var. *latifolium* (Schwägr.) Kindb.

b var. ***schleicheri***

30 ***P. torquescens*** (Bruch & Schimp.) Ros & Mazimpaka [*Bryum torquescens* Bruch & Schimp., *Rosulabryum torquescens* (Bruch & Schimp.) J.R.Spence]

31 ***P. turbinatum*** (Hedw.) J.R.Spence [*Bryum turbinatum* (Hedw.) Turner] [387]

32 ***P. warneum*** (Röhl.) J.R.Spence [*Bryum warneum* (Röhl.) Brid.] [388]

33 ***P. weigelii*** (Biehler) J.R.Spence [*Bryum weigelii* Biehler] [389]

34 ***P. wrightii*** (Sull. & Lesq.) J.R.Spence [*Bryum wrightii* Sull. & Lesq.] [390]

35 ***P. zieri*** (Hedw.) Holyoak & N.Pedersen [*Plagiobryum zieri* (Hedw.) Lindb.]

145 ***Rhodobryum*** (Schimp.) Limpr.

1 ***R. ontariense*** (Kindb.) Kindb.

2 ***R. roseum*** (Hedw.) Limpr.

Mniaceae Schwägr.

Mielichhoferioideae M.Stech & W.Frey

146 ***Mielichhoferia*** Nees & Hornsch.

1 ***M. elongata*** (Hoppe & Hornsch. ex Hook.) Hornsch.

2 ***M. mielichhoferiana*** (Funck) Loeske

147 ***Pohlia*** Hedw.

1 ***P. andalusica*** (Höhn.) Broth.

2 ***P. andrewsii*** A.J.Shaw

3 ***P. annotina*** (Hedw.) Lindb.

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[385] *Bryum salinum* is very close to *Ptychostomum inclinatum* (Holyoak and Pedersen 2007), and this is supported by sequence data from DNA barcoding markers (D. Bell et al. *in litt.*).

[386] DNA barcoding results and data from a nuclear genomic dataset show that *Bryum schleicheri* is better placed in *Ptychostomum* (D. Bell et al., *in litt.*). However, relationships between the two varieties remain uncertain, as the two datasets are not directly comparable, and a study is needed to clarify the position of *Ptychostomum schleicheri* var. *latifolium*. As a large, swollen plant with concave leaves, it is the plant that is understood as *P. schleicheri* in many parts of Europe. var. *schleicheri* is less well known, sometimes because it is misidentified as *Ptychostomum turbinatum.*

[387] Spence's placement of *Bryum turbinatum* in *Ptychostomum* is supported by molecular evidence (D. Bell et al., *in litt.*).

[388] Spence's placement of *Bryum warneum* in *Ptychostomum* is supported by molecular evidence (D. Bell et al., *in litt.*).

[389] *Ptychostomum weigelii* has been considered an invalid combination since Spence (2005) cited Sprengel (1807, July) as the author of the basionym name *Bryum weigelii*, when the name was in fact published validly by Biehler (1807, May) a couple of months earlier. However, since Spence simply cited the wrong publication, and did not omit any clear reference to the basionym, this is a correctable error (cf. ICBN Art. 41.8(a); Turland et al. 2018).

[390] *Bryum wrightii* was placed in *Ptychostomum* by Holyoak and Pedersen (2007), following Pedersen et al. (2003).

4 ***P. atropurpurea*** (Wahlenb.) H.Lindb.
5 ***P. beringiensis*** A.J.Shaw [391]
6 ***P. bolanderi*** (Lesq.) Broth.
7 ***P. bulbifera*** (Warnst.) Warnst.
8 ***P. camptotrachela*** (Renauld & Cardot) Broth.
9 ***P. cruda*** (Hedw.) Lindb.
10 ***P. crudoides*** (Sull. & Lesq.) Broth.
11 ***P. drummondii*** (Müll.Hal.) A.L.Andrews
12 ***P. elongata*** Hedw.
  a var. ***acuminata*** (Hornsch.) Huebener
  b var. ***elongata***
  c var. ***greenii*** (Brid.) A.J.Shaw
13 ***P. erecta*** Lindb.
14 ***P. filum*** (Schimp.) Mårtensson
15 ***P. flexuosa*** Hook.
  a var. ***flexuosa***
  b var. ***pseudomuyldermansii*** (Arts, Nordhorn-Richter & A.J.E.Sm.) A.J.E.Sm.
16 ***P. lescuriana*** (Sull.) Ochi
17 ***P. longicolla*** (Hedw.) Lindb.
18 ***P. ludwigii*** (Spreng. ex Schwägr.) Broth.
19 ***P. lutescens*** (Limpr.) H.Lindb.
20 ***P. melanodon*** (Brid.) A.J.Shaw
21 ***P. nutans*** (Hedw.) Lindb.
  a subsp. ***nutans***
  b subsp. ***schimperi*** (Müll.Hal.) Nyholm
22 ***P. obtusifolia*** (Vill. ex Brid.) L.F.Koch
23 ***P. proligera*** (Kindb.) Lindb. ex Broth.
24 ***P. scotica*** Crundw.
25 ***P. sphagnicola*** (Bruch & Schimp.) Broth.
26 ***P. tundrae*** A.J.Shaw
27 ***P. vexans*** (Limpr.) H.Lindb.
28 ***P. wahlenbergii*** (F.Weber & D.Mohr) A.L.Andrews
  a var. ***calcarea*** (Warnst.) E.F.Warb.
  b var. ***glacialis*** (Brid.) E.F.Warb.
  c var. ***wahlenbergii***

148 ***Schizymenium*** Harv.
1 ***S. pontevedrense*** (Luisier) Sérgio Casas, Cros & Brugués

Mnioideae L.Söderstr. & N.G.Hodgetts [392]

149 ***Cinclidium*** Sw.
1 ***C. arcticum*** (Bruch & Schimp.) Schimp.
2 ***C. latifolium*** Lindb.
3 ***C. minutifolium*** Broth. [393]

[391] *Pohlia beringiensis* was reported from Arctic Russia new to Europe by Ignatov et al. (2006).
[392] The subfamily Mnioideae is in general usage but until now it never seems to have been validly published.
[393] *Cinclidium minutifolium* was reported from Arctic Russia new to Europe by Koponen and Ignatova (2018).

4 ***C. stygium*** Sw.
5 ***C. subrotundum*** Lindb.

150 ***Cyrtomnium*** Holmen
1 ***C. hymenophylloides*** (Huebener) T.J.Kop.
2 ***C. hymenophyllum*** (Bruch & Schimp.) Holmen

151 ***Epipterygium*** Lindb.
1 ***E. tozeri*** (Grev.) Lindb.

152 ***Mnium*** Hedw.
1 ***M. blyttii*** Bruch & Schimp.
2 ***M. heterophyllum*** (Hook.) Schwägr.
3 ***M. hornum*** Hedw.
4 ***M. lycopodioides*** Schwägr.
5 ***M. marginatum*** (Dicks.) P.Beauv.
a var. ***dioicum*** (H.Müll.) Crundw.
b var. ***marginatum***
6 ***M. spinosum*** (Voit) Schwägr.
7 ***M. spinulosum*** Bruch & Schimp.
8 ***M. stellare*** Hedw.
9 ***M. thomsonii*** Schimp.

153 ***Plagiomnium*** T.J.Kop. [*Orthomnion* Wils. in Mitt.] [394]
section *Plagiomnium*
1 ***P. affine*** (Blandow ex Funck) T.J.Kop. [*Orthomnion affine* (Blandow ex Funck) T.J.Kop. & Yu Sun]
2 ***P. curvatulum*** (Lindb.) Schljakov [*Orthomnion curvatulum* (Lindb.) T.J.Kop. & Yu Sun]
3 ***P. cuspidatum*** (Hedw.) T.J.Kop. [*Orthomnion cuspidatum* (Hedw.) T.J.Kop. & Yu Sun]
4 ***P. drummondii*** (Bruch & Schimp.) T.J.Kop. [*Orthomnion drummondii* (Bruch & Schimp.) T.J.Kop. & Yu Sun]
5 ***P. elatum*** (Bruch & Schimp.) T.J.Kop. [*Orthomnion elatum* (Bruch & Schimp.) T.J.Kop. & Yu Sun]
6 ***P. ellipticum*** (Brid.) T.J.Kop. [*Orthomnion ellipticum* (Brid.) T.J.Kop. & Yu Sun]
7 ***P. medium*** (Bruch & Schimp.) T.J.Kop. [*Orthomnion medium* (Bruch & Schimp.) T.J.Kop. & Yu Sun]
section *Undulata* (Hedw.) T.J.Kop.
8 ***P. confertidens*** (Lindb. & Arnell) T.J.Kop. [*Orthomnion confertidens* (Lindb. & Arnell) T.J.Kop. & Yu Sun]
9 ***P. undulatum*** (Hedw.) T.J.Kop. [*Orthomnion undulatum* (Hedw.) T.J.Kop. & Yu Sun]
a var. ***madeirense*** T.J.Kop. & Sérgio [*Orthomnion undulatum* var. *madeirense* (T.J.Kop. & Sérgio) T.J.Kop. & Yu Sun]
b var. ***undulatum***
section *Rostrata* (Hedw.) T.J.Kop.

[394] The species of *Plagiomnium* were transferred to *Orthomnion* by Koponen and Sun (2017), but there is currently a proposal to conserve the name *Plagiomnium* (Ochyra et al. 2017). Consequently *Plagiomnium* is retained.

10 ***P. rostratum*** (Schrad.) T.J.Kop. [*Orthomnion rostratum* (Schrad.) T.J.Kop. & Yu Sun]

154 ***Pseudobryum*** (Kindb.) T.J.Kop.
1 ***P. cinclidioides*** (Huebener) T.J.Kop.

155 ***Rhizomnium*** (Broth.) T.J.Kop.
1 ***R. andrewsianum*** (Steere) T.J.Kop.
2 ***R. gracile*** T.J.Kop.
3 ***R. magnifolium*** (Horik.) T.J.Kop.
4 ***R. pseudopunctatum*** (Bruch & Schimp.) T.J.Kop.
5 ***R. punctatum*** (Hedw.) T.J.Kop.
a var. ***hermanperssonii*** T.J.Kop. [395]
b var. ***punctatum***

156 ***Trachycystis*** Lindb.
1 ***T. ussuriensis*** (Maack & Regel) T.J.Kop.

Orthotrichales Dixon

Orthotrichaceae Arn.
Orthotrichoideae Broth.

157 ***Codonoblepharon*** Schwägr.
1 ***C. forsteri*** (Dicks.) Goffinet [*Zygodon forsteri* (Dicks.) Mitt.] [396]

158 ***Lewinskya*** F.Lara, Garilleti & Goffinet [397]
1 ***L. acuminata*** (H.Philib.) F.Lara, Garilleti & Goffinet [*Orthotrichum acuminatum* H.Philib.]
2 ***L. affinis*** (Schrad. ex Brid.) F.Lara, Garilleti & Goffinet [*Orthotrichum affine* Schrad. ex Brid., *Orthotrichum affine* var. *bohemicum* Plášek & Sawicki]
3 ***L. breviseta*** (F.Lara, Garilleti & Mazimpaka) F.Lara, Garilleti & Goffinet [*Orthotrichum speciosum* var. *brevisetum* F.Lara, Garilleti & Mazimpaka]
4 ***L. elegans*** (Schwägr. ex Hook. & Grev.) F.Lara, Garilleti & Goffinet [*Orthotrichum elegans* Schwägr. ex Hook. & Grev.] [398]
5 ***L. fastigiata*** (Bruch ex Brid.) Vigalondo, F.Lara & Garilleti [*Orthotrichum fastigiatum* Bruch ex Brid.] [399]
6 ***L. iberica*** (F.Lara & Mazimpaka) F.Lara, Garilleti & Goffinet [*Orthotrichum ibericum* F.Lara & Mazimpaka]
7 ***L. iwatsukii*** (Ignatov) F.Lara, Garilleti & Goffinet [*Orthotrichum iwatsukii* Ignatov, *Orthotrichum laevigatum* var. *japonicum* (Z.Iwats.) Lewinsky, *Orthotrichum macounii* subsp. *japonicum* Z.Iwats.] [400]

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[395] *Rhizomnium punctatum* var. *hermanperssonii* was described from Madeira by Koponen (2017).
[396] Molecular evidence (Goffinet et al. 2004) suggests that *Zygodon forsteri* is best placed in *Codonoblepharon*. This is supported by current thinking (Mazimpaka and Lara 2014).
[397] *Lewinskya* was established as a genus to accommodate the monoicous and phaneroporous taxa of *Orthotrichum* (Lara et al. 2016).
[398] Vitt and Darigo (1997) established that *Lewinskya elegans* was distinct from *Lewinskya speciosa* in North America. It is now known to be widespread in European Russia (Fedosov and Doroshina 2018), and probably overlooked elsewhere in Europe.
[399] *Lewinskya fastigiata* was reinstated by Vigalondo et al. (2019a), on the basis of integrative taxonomic analyses on the *Lewinskya affinis* complex.

8 ***L. laevigata*** (J.E.Zetterst.) F.Lara, Garilleti & Goffinet [*Orthotrichum laevigatum* J.E.Zetterst.]
9 ***L. lamyana*** F.Lara, Garilleti, Draper & Mazimpaka [401]
10 ***L. pylaisii*** (Brid.) F.Lara, Garilleti & Goffinet [*Orthotrichum pylaisii* Brid.]
11 ***L. rupestris*** (Schleich. ex Schwägr.) F.Lara, Garilleti & Goffinet [*Orthotrichum rupestre* Schleich. ex Schwägr.]
12 ***L. shawii*** (Wilson) F.Lara, Garilleti & Goffinet [*Orthotrichum shawii* Wilson]
13 ***L. sordida*** (Sull. & Lesq. in Austin) F.Lara, Garilleti & Goffinet [*Orthotrichum sordidum* Sull. & Lesq. in Austin]
14 ***L. speciosa*** (Nees) F.Lara, Garilleti & Goffinet [*Orthotrichum speciosum* Nees]
15 ***L. striata*** (Hedw.) F.Lara, Garilleti & Goffinet [*Orthotrichum striatum* Hedw.]
16 ***L. tortidontia*** (F.Lara, Garilleti & Mazimpaka) F.Lara, Garilleti & Goffinet [*Orthotrichum tortidontium* F.Lara, Garilleti & Mazimpaka]
17 ***L. transcaucasica*** Eckstein, Garilleti & F.Lara [402]
18 ***L. vladikavkana*** (Venturi) F.Lara, Garilleti & Goffinet [*Orthotrichum vladikavkana* Venturi]

159 ***Nyholmiella*** Holmen & E.Warncke [403]
1 ***N. gymnostoma*** (Bruch ex Brid.) Holmen & E.Warncke [*Orthotrichum gymnostomum* Bruch ex Brid.]
2 ***N. obtusifolia*** (Brid.) Holmen & E.Warncke [*Orthotrichum obtusifolium* Brid.]

160 ***Orthotrichum*** Hedw.
1 ***O. alpestre*** Bruch & Schimp.
2 ***O. anomalum*** Hedw.
3 ***O. bistratosum*** (Schiffn.) Guerra [*Orthotrichum cupulatum* var. *bistratosum* Schiffn.] [404]
4 ***O. callistomum*** Fisch.-Oost. ex Bruch & Schimp.
5 ***O. cambrense*** Bosanquet & F.Lara [405]
6 ***O. casasianum*** F.Lara, Garilleti & Mazimpaka
7 ***O. columbicum*** Mitt. [*Orthotrichum consimile* auct. eur., non Mitt.] [406]
8 ***O. comosum*** F.Lara, R.Medina & Garilleti [407]
9 ***O. consobrinum*** Cardot [408]
10 ***O. crenulatum*** Mitt.
11 ***O. cupulatum*** Brid.
a var. ***cupulatum***
b var. ***fuscum*** (Venturi) Boulay

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[400] *Lewinskya iwatsukii* is an Asian taxon described as a subspecies of *Orthotrichum macounii* by Iwatuski (1959), raised to species level by Ignatov et al. (2001), and later discovered in Europe (Fedosov and Doroshina 2018).
[401] *Lewinskya lamyana* was described from Spain by Lara et al. (2018).
[402] *Lewinskya transcaucasica* is a recently described species (Eckstein et al. 2018), which has subsequently been found in the European Caucasus by Fedosov et al. (2017d).
[403] The recognition of *Nyholmiella* at generic level is supported by molecular evidence (Goffinet et al. 2004, Sawicki et al. 2010).
[404] *Orthotrichum cupulatum* var. *bistratosum* was raised to species level by Guerra (1985), although only recently it has been recognised as such (Lara & Garilleti 2014).
[405] Bosanquet and Lara (2012) described *Orthotrichum cambrense* from Wales.
[406] *Orthotrichum columbicum* was recognised as a species distinct from *Orthotrichum consimile* Mitt. by Medina et al. (2012). *Orthotrichum consimile* s.str. is confined to the west coast of North America.
[407] *Orthotrichum comosum* was described from southern Europe by Medina et al. (2013).
[408] *Orthotrichum consobrinum* is an Asian species detected in Europe (Spain) by Lara et al. (2009).

c var. ***riparium*** Huebener
12 ***O. dagestanicum*** Fedosov & Ignatova [409]
13 ***O. dentatum*** T.Kiebacher & Lüth [410]
14 ***O. diaphanum*** Brid.
15 ***O. handiense*** F.Lara, Garilleti & Mazimpaka
16 ***O. hispanicum*** F.Lara, Garilleti & Mazimpaka
17 ***O. macrocephalum*** F.Lara, Garilleti & Mazimpaka
18 ***O. microcarpum*** De Not.
19 ***O. moravicum*** Plášek & Sawicki [411]
20 ***O. pallens*** Bruch ex Brid.
21 ***O. patens*** Bruch ex Brid.
22 ***O. pellucidum*** Lindb.
23 ***O. philibertii*** Venturi
24 ***O. pulchellum*** Brunt.
25 ***O. pumilum*** Sw. ex anon.
26 ***O. rivulare*** Turner
27 ***O. rogeri*** Brid.
28 ***O. scanicum*** Grönvall
29 ***O. schimperi*** Hammar
30 ***O. shevockii*** Lewinsky-Haapasaari & D.H.Norris [412]
31 ***O. sibiricum*** (Grönvall) Warnst. [*Orthotrichum holmenii* Lewinsky-Haapasaari] [413]
32 ***O. sprucei*** Mont.
33 ***O. stellatum*** Brid.
34 ***O. stramineum*** Hornsch. ex Brid.
35 ***O. tenellum*** Bruch ex Brid.
36 ***O. urnigerum*** Myrin
37 ***O. vittii*** F.Lara, Garilleti & Mazimpaka

161 ***Plenogemma*** Plášek, Sawicki & Ochyra [414]
1 ***P. phyllantha*** (Brid.) Sawicki, Plášek & Ochyra [*Ulota phyllantha* Brid.)

162 ***Pulvigera*** Plášek, Sawicki & Ochyra [415]
1 ***P. lyellii*** (Hook. & Taylor) Plášek, Sawicki & Ochyra [*Orthotrichum lyellii* Hook. & Taylor]

163 ***Ulota*** D.Mohr
1 ***U. bruchii*** Hornsch. ex Brid.
2 ***U. calvescens*** Wilson
3 ***U. coarctata*** (P.Beauv.) Hammar
4 ***U. crispa*** (Hedw.) Brid. [416]

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[409] *Orthotrichum dagestanicum* was described from the Caucasus by Fedosov and Ignatova (2010).
[410] *Orthotrichum dentatum* was described from the Alps by Kiebacher and Lüth (2017).
[411] *Orthotrichum moravicum* was described from central Europe by Plášek et al. (2009).
[412] *Orthotrichum shevockii* is a disjunct species described from California and recently found in the Canary Islands (Vigalondo et al. 2019b).
[413] *Orthotrichum sibiricum* is a north Asian species with one known occurrence in European Arctic Russia (Fedosov et al. 2017b).
[414] Sawicki et al. (2017) provide molecular evidence for the treatment of Plášek et al. (2015), segregating *Ulota phyllantha* in the genus *Plenogemma*.
[415] Sawicki et al. (2017) provide molecular evidence for the treatment of Plášek et al. (2015), segregating *Orthotrichum lyellii* in the genus *Pulvigera*.

5 ***U. crispula*** Bruch [*Ulota crispa* var. *crispula* (Bruch) Hammar]
6 ***U. curvifolia*** (Wahlenb.) Lilj.
7 ***U. drummondii*** (Hook. & Grev.) Brid.
8 ***U. hutchinsiae*** (Sm.) Hammar
9 ***U. intermedia*** Schimp. [*Ulota crispa* var. *intermedia* (Schimp.) Cardot]
10 ***U. macrospora*** E.Bauer & Warnst.
11 ***U. rehmannii*** Jur.

164 ***Zygodon*** Hook. & Taylor
1 ***Z. catarinoi*** C.Garcia, F.Lara, Sérgio & Sim-Sim [*Zygodon bistratus* Calabrese & J.Muñoz] [417]
2 ***Z. conoideus*** (Dicks.) Hook. & Taylor
a var. ***conoideus***
b var. ***lingulatus*** S.R.Edwards
3 ***Z. dentatus*** (Limpr.) Kartt.
4 ***Z. gracilis*** Wilson
5 ***Z. rupestris*** Schimp. ex Lorentz
6 ***Z. sibiricus*** Ignatov, Ignatova, Z.Iwats. & B.C.Tan
7 ***Z. stirtonii*** Schimp. ex Stirt.
8 ***Z. viridissimus*** (Dicks.) Brid.

Orthodontiales N.E.Bell, A.E.Newton & D.Quandt

Orthodontiaceae Goffinet

165 ***Leptotheca*** Schwägr.
1 ***L. gaudichaudii*** Schwägr.

166 ***Orthodontium*** Schwägr.
1 ***O. gracile*** (Wilson) Schwägr. ex Bruch & Schimp.
2 ***O. lineare*** Schwägr.
3 ***O. pellucens*** (Hook.) Bruch & Schimp.

Aulacomniales N.E.Bell, A.E.Newton & D.Quandt

Aulacomniaceae Schimp.

167 ***Aulacomnium*** Schwägr.
1 ***A. androgynum*** (Hedw.) Schwägr.
2 ***A. palustre*** (Hedw.) Schwägr.
3 ***A. turgidum*** (Wahlenb.) Schwägr.

Rhizogoniales Goffinet & W.R.Buck

Rhizogoniaceae Broth.

168 ***Calomnion*** Hook.f. & Wilson
1 ***C. complanatum*** (Hook.f. & Wilson) Lindb.

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[416] The treatment of the *Ulota crispa* complex (*Ulota crispa* s.str., *Ulota crispula*, *Ulota intermedia*) follows Caparrós et al. (2016).

[417] *Zygodon catarinoi* was described from Spain, Portugal and Morocco by Garcia et al. (2006), and has subsequently been found elsewhere in the Mediterranean region.

Version Today

Hookeriales M.Fleisch.

Hypopterygiaceae Mitt.

169 ***Hypopterygium*** Brid.
- 1 ***H. tamarisci*** (Sw.) Brid. ex Müll.Hal.

Daltoniaceae Schimp.

170 ***Achrophyllum*** Vitt & Crosby
- 1 ***A. dentatum*** (Hook.f. & Wilson) Vitt & Crosby

171 ***Calyptrochaeta*** Desv.
- 1 ***C. apiculata*** (Hook.f. & Wilson) Vitt

172 ***Daltonia*** Hook. & Taylor
- 1 ***D. splachnoides*** (Sm.) Hook. & Taylor
- 2 ***D. stenophylla*** Mitt.

173 ***Distichophyllum*** Dozy & Molk.
- 1 ***D. carinatum*** Dixon & W.E.Nicholson

Hookeriaceae Schimp.

174 ***Hookeria*** J.E.Sm.
- 1 ***H. lucens*** (Hedw.) Sm.

Leucomiaceae Broth.

175 ***Tetrastichium*** (Mitt.) Cardot
- 1 ***T. fontanum*** (Mitt.) Cardot
- 2 ***T. virens*** (Cardot) S.P.Churchill

Pilotrichaceae Kindb.
Hypnelloideae Broth.

176 ***Cyclodictyon*** Mitt.
- 1 ***C. laetevirens*** (Hook. & Taylor) Mitt.

Hypnales W.R.Buck & Vitt

Fontinalaceae Schimp.

177 ***Dichelyma*** Myrin
- 1 ***D. capillaceum*** (L. ex Dicks.) Myrin
- 2 ***D. falcatum*** (Hedw.) Myrin

178 ***Fontinalis*** Hedw.
- 1 ***F. antipyretica*** Hedw.
  - a subsp. ***antipyretica***
  - b subsp. ***bryhnii*** (Limpr.) Podp.
  - c subsp. ***gracilis*** (Lindb.) Kindb.
  - d subsp. ***kindbergii*** (Renauld & Cardot) Cardot
- 2 ***F. dalecarlica*** Schimp.
- 3 ***F. dichelymoides*** Lindb.
- 4 ***F. hypnoides*** C.Hartm.
  - a var. ***duriaei*** (Schimp.) Kindb.

b var. ***hypnoides***

5 ***F. squamosa*** Hedw. [*Fontinalis squamosa* var. *curnowii* Cardot, *Fontinalis squamosa* var. *dixonii* (Cardot) A.J.E.Sm.] [418]

Plagiotheciaceae M.Fleisch.

179 ***Herzogiella*** Broth.
1 ***H. seligeri*** (Brid.) Z.Iwats.
2 ***H. striatella*** (Brid.) Z.Iwats.
3 ***H. turfacea*** (Lindb.) Z.Iwats.

180 ***Isopterygiopsis*** Z.Iwats.
1 ***I. alpicola*** (Lindb. & Arnell) Hedenäs
2 ***I. muelleriana*** (Schimp.) Z.Iwats.
3 ***I. pulchella*** (Hedw.) Z.Iwats.

181 ***Plagiothecium*** Bruch & Schimp. [*Buckiella* Ireland]
1 ***P. berggrenianum*** Frisvoll
2 ***P. cavifolium*** (Brid.) Z.Iwats.
3 ***P. curvifolium*** Schlieph. ex Limpr.
4 ***P. denticulatum*** (Hedw.) Schimp.
a var. ***denticulatum***
b var. ***obtusifolium*** (Turner) Moore
c var. ***undulatum*** R.Ruthe ex Geh.
5 ***P. laetum*** Schimp.
6 ***P. latebricola*** Schimp.
7 ***P. neckeroideum*** Schimp.[*Plagiothecium noricum* Molendo ex Limpr.] [419]
8 ***P. nemorale*** (Mitt.) A.Jaeger
9 ***P. piliferum*** (Sw.) Schimp.
10 ***P. platyphyllum*** Mönk.
11 ***P. rossicum*** Ignatov & Ignatova [420]
12 ***P. succulentum*** (Wilson) Lindb.
13 ***P. svalbardense*** Frisvoll
14 ***P. undulatum*** (Hedw.) Schimp. [*Buckiella undulata* (Hedw.) Ireland]

182 ***Myurella*** Bruch & Schimp.
1 ***M. julacea*** (Schwägr.) Schimp.
2 ***M. sibirica*** (Müll.Hal.) Reimers
3 ***M. tenerrima*** (Brid.) Lindb.

183 ***Ortholimnobium*** Dixon
1 ***O. handelii*** (Broth.) C.Schröck & J.T.Wynns [*Plagiothecium handelii* Broth.] [421]

184 ***Orthothecium*** Bruch & Schimp.
1 ***O. chryseon*** (Schwägr.) Schimp.
2 ***O. intricatum*** (Hartm.) Schimp.

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[418] We follow Hill et al. (2008) and Guerra (2014) in treating *Fontinalis squamosa* var. *dixonii* as synonymous with the type, and var. *curnowii* is also considered to have no taxonomic value.

[419] The status of *Plagiothecium noricum* Molendo ex. Limpr., and its relation to *Plagiothecium neckeroideum*, still needs clarification.

[420] *Plagiothecium rossicum* was descibred from Russia by Ignatova et al. (2019).

[421] *Plagiothecium handelii* was recorded new to Europe, and its position in *Ortholimnobium* confirmed, by Wynns and Schröck (2018).

3 ***O. lapponicum*** (Schimp.) C.Hartm.
4 ***O. rufescens*** (Dicks. ex Brid.) Schimp.
5 ***O. strictum*** Lorentz

185 ***Platydictya*** Berk.
1 ***P. jungermannioides*** (Brid.) H.A.Crum

186 ***Pseudotaxiphyllum*** Z.Iwats.
1 ***P. elegans*** (Brid.) Z.Iwats.
2 ***P. laetevirens*** (Dixon & Luisier ex F.Koppe & Düll) Hedenäs

Fabroniaceae Schimp.

187 ***Fabronia*** Raddi
1 ***F. altaica*** Ignatova & Ignatov [422]
2 ***F. ciliaris*** (Brid.) Brid.
3 ***F. major*** De Not. [423]
4 ***F. pusilla*** Raddi

Pterigynandraceae Schimp.

188 ***Pterigynandrum*** Hedw.
1 ***P. filiforme*** Hedw. [*Pterigynandrum filiforme* var. *majus* (De Not.) De Not.] [424]

Habrodontaceae Schimp.

189 ***Habrodon*** Schimp.
1 ***H. perpusillus*** (De Not.) Lindb.

Climaciaceae Kindb.

190 ***Climacium*** F.Weber & D.Mohr
1 ***C. dendroides*** (Hedw.) F.Weber & D.Mohr

Myriniaceae Schimp.

191 ***Myrinia*** Schimp.
1 ***M. pulvinata*** (Wahlenb.) Schimp.

Amblystegiaceae G.Roth
Cratoneuroideae Vanderp., Hedenäs, C.J.Cox & A.J.Shaw

192 ***Cratoneuron*** (Sull.) Spruce
1 ***C. curvicaule*** (Jur.) G.Roth
2 ***C. filicinum*** (Hedw.) Spruce

193 ***Palustriella*** Ochyra
1 ***P. commutata*** (Hedw.) Ochyra
2 ***P. decipiens*** (De Not.) Ochyra

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[422] *Fabronia altaica* was described from Russia by Ignatova et al. (2017). In Europe it is restricted to the Caucasus.
[423] *Fabronia major* was resurrected in the course of a study on the genus *Fabronia* in Russia by Ignatova et al. (2017).
[424] According to Hill et al. (2008), ”Smith (2004) retains *Pterigynandrum filiforme* var. *majus* but expresses severe doubts as to whether it is distinct. It is treated here as a synonym of var. *filiforme.*” We follow this treatment.

3 ***P. falcata*** (Brid.) Hedenäs [*Palustriella commutata* var. *sulcata* (Lindb.) Ochyra, *Palustriella pluristratosa* M.Stech & J.-P.Frahm] [425]

Amblystegioideae Broth.

194 ***Amblystegium*** Schimp.
1 ***A. serpens*** (Hedw.) Schimp. [*Amblystegium serpens* var. *salinum* Carrington]

195 ***Anacamptodon*** Brid.
1 ***A. splachnoides*** (Froel. ex Brid.) Brid.

196 ***Arvernella*** Hugonnot & Hedenäs [426]
1 ***A. microclada*** Hugonnot & Hedenäs

197 ***Campyliadelphus*** (Kindb.) R.S.Chopra
1 ***C. chrysophyllus*** (Brid.) R.S.Chopra
2 ***C. elodes*** (Lindb.) Kanda

198 ***Campylium*** (Kindb.) R.S.Chopra
1 ***C. bambergeri*** (Schimp.) Hedenäs, Schlesak & D.Quandt [*Hypnum bambergeri* Schimp.] [427]
2 ***C. laxifolium*** Engelmark & Hedenäs
3 ***C. longicuspis*** (Lindb. & Arnell) Hedenäs
4 ***C. protensum*** (Brid.) Kindb. [428]
5 ***C. stellatum*** (Hedw.) Lange & C.E.O.Jensen

199 ***Campylophyllopsis*** W.R.Buck [*Campylidium* (Kindb.) Ochyra, *nom. illeg.*] [429]
1 ***C. calcarea*** (Crundw. & Nyholm) Ochyra [*Campylidium calcareum* (Crundw. & Nyholm) Ochyra, *Campylophyllum calcareum* (Crundw. & Nyholm) Hedenäs]
2 ***C. sommerfeltii*** (Myrin) Ochyra [*Campylidium sommerfeltii* (Myrin) Ochyra, *Campylophyllum sommerfeltii* (Myrin) Hedenäs]

200 ***Campylophyllum*** (Schimp.) M.Fleisch.
1 ***C. halleri*** (Hedw.) M.Fleisch.
2 ***C. montanum*** (Lindb.) B.H.Allen [*Hygrohypnum montanum* (Lindb.) Broth., *Platyhypnum montanum* (Lindb.) Ochyra] [430]

201 ***Conardia*** H.Rob. [431]

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[425] The synonymy of *Palustriella pluristratosa* with *Palustriella falcata* follows Hedenäs (2010). The taxonomic value of *Palustriella commutata* var. *sulcata* should be studied in more detail. It is a characteristic plant of high altitude limestone in the Alps.

[426] *Arvernella* is a new genus, described by Hugonnot and Hedenäs (2015) to accommodate *Arvernella microclada*, a new species found in the Auvergne, France. Its placement in the Amblystegioideae is supported by recent analysis by Kučera et al. (2019).

[427] Molecular evidence places *Hypnum bambergeri* in *Campylium* (Schlesak et al. 2018).

[428] *Campylium protensum* and *Campylium stellatum* are distinct in some parts of their range and overlap in others. They are retained as separate species for the present, although there is a strong case for *Campylium protensum* to be reduced to a variety of *Campylium stellatum*, as some authors have done.

[429] The separation of *Campylidium* from *Campylophyllum* is supported by molecular studies (Gardiner et al. 2005, Ignatov et al. 2007). However, *Campylidium* is an illegitimate name and must be changed to *Campylophyllopsis* (Goffinet et al. 2009).

[430] Ochyra (2013) placed *Hygrohypnum montanum* in *Platyhypnum*. Allen (2014) transferred it to *Campylophyllum*.

1 ***C. compacta*** (Drumm. ex Müll.Hal.) H.Rob.

202 ***Drepanium*** (Schimp.) C.E.O.Jensen [432]
1 ***D. fastigiatum*** (Hampe) C.E.O.Jensen [*Hypnum recurvatum* (Lindb. & Arnell) Kindb., *Drepanium recurvatum* (Lindb. & Arnell) G.Roth]

203 ***Drepanocladus*** (Müll.Hal.) G.Roth [433]
1 ***D. aduncus*** (Hedw.) Warnst.
2 ***D. angustifolius*** (Hedenäs) Hedenäs & C.Rosborg [*Pseudocalliergon angustifolium* Hedenäs]
3 ***D. arcticus*** (R.S.Williams) Hedenäs
4 ***D. brevifolius*** (Lindb.) Warnst. [*Pseudocalliergon brevifolium* (Lindb.) Hedenäs]
5 ***D. capillifolius*** (Warnst.) Warnst. [*Drepanocladus longifolius* auct. eur., non (Mitt.) Paris] [434]
6 ***D. lycopodioides*** (Brid.) Warnst. [*Pseudocalliergon lycopodioides* (Brid.) Hedenäs]
7 ***D. polygamus*** (Schimp.) Hedenäs [435]
8 ***D. sendtneri*** (Schimp. ex H.Müll.) Warnst.
9 ***D. sordidus*** (Müll.Hal.) Hedenäs
10 ***D. trifarius*** (F.Weber & D.Mohr) Broth. ex Paris [*Pseudocalliergon trifarium* (F.Weber & D.Mohr) Loeske]
11 ***D. turgescens*** (T.Jensen) Broth. [*Pseudocalliergon turgescens* (T.Jensen) Loeske]

204 ***Hygroamblystegium*** Loeske [436]
1 ***H. fluviatile*** (Hedw.) Loeske
2 ***H. humile*** (P.Beauv.) Vanderp., Goffinet & Hedenäs [*Hygroamblystegium varium* var. *humile* Vanderp. & Hedenäs] [437]
3 ***H. tenax*** (Hedw.) Jenn.
4 ***H. varium*** (Hedw.) Mönk. [*Amblystegium varium* (Hedw.) Lindb.]

205 ***Hygrohypnum*** Lindb.
1 ***H. luridum*** (Hedw.) Jenn.
2 ***H. styriacum*** (Limpr.) Broth.

206 ***Leptodictyum*** (Schimp.) Warnst.
1 ***L. riparium*** (Hedw.) Warnst.

207 ***Microhypnum*** Jan Kučera & Ignatov

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[431] Although here retained in the Amblystegiaceae, *Conardia* does not appear to belong here, and may require a family of its own (see, for example, Vanderpoorten et al. 2002).
[432] Recent molecular studies place *Hypnum recurvatum* in the genus *Drepanium* (Schlesak et al. 2018).
[433] This treatment of *Drepanocladus* follows Hedenäs and Rosborg (2008).
[434] *Drepanocladus longifolius* is an exclusively Southern Hemisphere species; Saługa et al. (2018) showed that European records of this species should be referred to *Drepanocladus capillifolius*.
[435] *Campylium decipiens* (Warnst.) Walsemann is a central European plant recognised as a distinct species by Frahm and Walsemann (1973) and Meinunger & Schröder (2007), but otherwise largely disregarded. It may be a form of *Drepanocladus polygamus*, but it requires further study.
[436] Although *Hygroamblystegium fluviatile*, *Hygroamblystegium humile* and *Hygroamblystegium tenax* have been synonymised with *Hygroamblystegium varium* (Vanderpoorten 2004), we follow Hill et al. (2006) in retaining these species as distinct pending further work.
[437] *Hygroamblystegium humile* was recognised at varietal level by Vanderpoorten and Hedenäs (2009), while *Hygroamblystegium fluviatile* and *Hygroamblystegium tenax* continued to be regarded as synonyms of *Amblystegium varium.*

1 ***M. sauteri*** (Schimp.) Jan Kučera & Ignatov [*Anacamptodon sauteri* (Schimp.) Hedenäs, Schlesak & D.Quandt, *Hypnum sauteri* Schimp.] [438]

208 ***Platyhypnum*** Loeske [*Ochyraea* Váňa] [439]
1 ***P. alpestre*** (Hedw.) Ochyra [*Hygrohypnum alpestre* (Hedw.) Loeske]
2 ***P. alpinum*** (Lindb.) Loeske [*Hygrohypnum alpinum* (Lindb.) Loeske]
3 ***P. cochlearifolium*** (Venturi) Ochyra [*Hygrohypnum cochlearifolium* (Venturi) Broth.]
4 ***P. duriusculum*** (De Not.) Ochyra [*Hygrohypnum duriusculum* (De Not.) D.W.Jamieson]
5 ***P. molle*** (Dix. ex Hedw.) Loeske [*Hygrohypnum molle* (Hedw.) Loeske]
6 ***P. norvegicum*** (Schimp.) Ochyra [*Hygrohypnum norvegicum* (Schimp.) J.J.Amann]
7 ***P. smithii*** (Sw.) Ochyra [*Hygrohypnum smithii* (Sw.) Broth.]
8 ***P. tatrense*** (Váňa) Hedenäs & Ignatov [*Ochyraea tatrensis* Váňa] [440]

209 ***Pseudoamblystegium*** Vanderp. & Hedenäs [441]
1 ***P. subtile*** (Hedw.) Vanderp. & Hedenäs [*Amblystegium subtile* (Hedw.) Schimp.]

210 ***Pseudocampylium*** Vanderp. & Hedenäs [442]
1 ***P. radicale*** (P.Beauv.) Vanderp. & Hedenäs [*Amblystegium radicale* (P.Beauv.) Schimp.]

211 ***Serpoleskea*** (Limpr.) Loeske
1 ***S. confervoides*** (Brid.) Schimp. [*Amblystegium confervoides* (Brid.) Schimp.] [443]

212 ***Tomentypnum*** Loeske
1 ***T. nitens*** (Hedw.) Loeske

Calliergonaceae Vanderp., Hedenäs, C.J.Cox & A.J.Shaw

213 ***Calliergon*** (Sull.) Kindb.
1 ***C. cordifolium*** (Hedw.) Kindb.
2 ***C. giganteum*** (Schimp.) Kindb.
3 ***C. megalophyllum*** Mikut.
4 ***C. richardsonii*** (Mitt.) Kindb.

214 ***Loeskypnum*** H.K.G.Paul
1 ***L. badium*** (Hartm.) H.K.G.Paul

215 ***Sarmentypnum*** Tuom. & T.J.Kop. [444]

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[438] On molecular evidence, Schlesak et al. (2018) placed *Hypnum sauteri* in *Anacamptodon* but Kučera *et al.* (2019) provided further evidence placing it in the new genus *Microhypnum*.
[439] We follow the treatment of Ochyra (2013) in transferring several *Hygrohypnum* species to *Platyhypnum*.
[440] *Ochyraea tatrensis* may be nothing more than an extreme form of *Platyhypnum smithii*, but for the present it is retained as a species and transferred to the genus *Platyhypnum* until further work is done.
[441] The genus *Pseudoamblystegium* was established by Vanderpoorten and Hedenäs (2009) to accommodate *Amblystegium subtile*.
[442] The genus *Pseudocampylium* was established by Vanderpoorten and Hedenäs (2009) to accommodate *Amblystegium radicale*.
[443] The placement of *Amblystegium confervoides* in *Serpoleskea* (Vanderpoorten et al. 2002) was confirmed by Vanderpoorten and Hedenäs (2009).
[444] The treatment of *Sarmentypnum* follows Hedenäs (2006).

1 ***S. exannulatum*** (Schimp.) Hedenäs [*Warnstorfia exannulata* (Schimp.) Loeske]
2 ***S. procerum*** (Renauld & Arnell) Hedenäs [*Warnstorfia procera* (Renauld & Arnell) Tuom.]
3 ***S. sarmentosum*** (Wahlenb.) Tuom. & T.J.Kop. [*Warnstorfia sarmentosa* (Wahlenb.) Hedenäs]
4 ***S. trichophyllum*** (Warnst.) Hedenäs [*Warnstorfia trichophylla* (Warnst.) Tuom. & T.J.Kop.]
5 ***S. tundrae*** (Arnell) Hedenäs [*Warnstorfia tundrae* (Arnell) Loeske]

216 ***Straminergon*** Hedenäs
1 ***S. stramineum*** (Dicks. ex Brid.) Hedenäs

217 ***Warnstorfia*** Loeske
1 ***W. fluitans*** (Hedw.) Loeske
2 ***W. pseudostraminea*** (Müll.Hal.) Tuom. & T.J.Kop.

Scorpidiaceae Ignatov & Ignatova

218 ***Hamatocaulis*** Hedenäs
1 ***H. lapponicus*** (Norrl.) Hedenäs
2 ***H. vernicosus*** (Mitt.) Hedenäs[445]

219 ***Hygrohypnella*** Ignatov & Ignatova [446]
1 ***H. ochracea*** (Turner ex Wilson) Ignatov & Ignatova [*Hygrohypnum ochraceum* (Turner ex Wilson) Loeske]
2 ***H. polaris*** (Lindb.) Ignatov & Ignatova [*Hygrohypnum polare* (Lindb.) Loeske]

220 ***Sanionia*** Loeske
1 ***S. nivalis*** Hedenäs [*Sanionia georgicouncinata* auct. eur., non (Müll.Hal.) Ochyra & Hedenäs] [447]
2 ***S. orthothecioides*** (Lindb.) Loeske
3 ***S. uncinata*** (Hedw.) Loeske

221 ***Scorpidium*** (Schimp.) Limpr.
1 ***S. cossonii*** (Schimp.) Hedenäs
2 ***S. revolvens*** (Sw. ex anon.) Rubers
3 ***S. scorpioides*** (Hedw.) Limpr.

Leskeaceae Schimp.

222 ***Claopodium*** (Lesq. & James) Renauld & Cardot
1 ***C. rostratum*** (Hedw.) Ignatov [*Anomodon rostratus* (Hedw.) Schimp.] [448]
2 ***C. whippleanum*** (Sull.) Renauld & Cardot

223 ***Leskea*** Hedw.
1 ***L. polycarpa*** Hedw.

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[445] *Hamatocaulis vernicosus* comprises two well-researched cryptic species in Europe. Careful morphological evaluation has failed to find any morphological difference between the two (Manukjanová et al. 2019).
[446] *Hygrohypnum ochraceum* and *Hygrohypnum polare* are placed in *Hygrohypnella*, following Ignatov and Ignatova (2004).
[447] Molecular studies showed European *Sanionia nivalis* to be distinct from the Southern Hemisphere *S. georgicouncinata* (Hedenäs 2012).
[448] Molecular studies place *Anomodon rostratus* in *Claopodium* (Ignatov et al. 2006).

224 ***Lindbergia*** Kindb. [449]
- 1 ***L. dagestanica*** Ignatova & Ignatov
- 2 ***L. grandiretis*** (Lindb. ex Broth.) Ignatov & Ignatova [*Lindbergia brachyptera* auct. eur., non (Mitt.) Kindb.]

225 ***Pseudoleskeopsis*** Broth. [450]
- 1 ***P. artariae*** (Thér.) Thér. [*Pseudoleskea artariae* Thér.]

Pseudoleskeaceae Schimp.

226 ***Lescuraea*** Bruch & Schimp. [*Pseudoleskea* Schimp., *Ptychodium* Schimp.] [451]
- 1 ***L. incurvata*** (Hedw.) E.Lawton [*Pseudoleskea incurvata* (Hedw.) Loeske]
- 2 ***L. mutabilis*** (Brid.) Lindb. ex I.Hagen
- 3 ***L. patens*** Lindb. [*Pseudoleskea patens* (Lindb.) Kindb.
- 4 ***L. plicata*** (Schleich. ex F.Weber & D.Mohr) Broth. [*Ptychodium plicatum* (Schleich. ex F.Weber & D.Mohr) Schimp.]
- 5 ***L. radicosa*** (Mitt.) Mönk. [*Pseudoleskea radicosa* (Mitt.) Macoun & Kindb.]
- 6 ***L. saviana*** (De Not.) E.Lawton [*Pseudoleskea saviana* (De Not.) Latzel]
- 7 ***L. saxicola*** (Schimp.) Molendo
- 8 ***L. secunda*** Arnell

Pseudoleskeellaceae Ignatov & Ignatova

227 ***Pseudoleskeella*** Kindb.
- 1 ***P. catenulata*** (Brid. ex Schrad.) Kindb.
- 2 ***P. nervosa*** (Brid.) Nyholm
- 3 ***P. papillosa*** (Lindb.) Kindb.
- 4 ***P. rupestris*** (Berggr.) Hedenäs & L.Söderstr.
- 5 ***P. tectorum*** (Funck ex Brid.) Kindb. ex Broth.

Thuidiaceae Schimp.

228 ***Abietinella*** Müll.Hal.
- 1 ***A. abietina*** (Hedw.) M.Fleisch.
  - a var. ***abietina***
  - b var. ***hystricosa*** (Mitt.) Sakurai

229 ***Haplocladium*** (Müll.Hal.) Müll.Hal.
- 1 ***H. angustifolium*** (Hampe & Müll.Hal.) Broth.
- 2 ***H. microphyllum*** (Hedw.) Broth.
- 3 ***H. virginianum*** (Brid.) Broth.

230 ***Helodium*** (Müll.Hal.) Müll.Hal. [452]

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[449] The treatment of *Lindbergia* follows Ignatova et al. (2010).

[450] The type of *Pseudoleskea* is *Pseudoleskea atrovirens* (=*Pseudoleskea incurvata*), now in *Lescuraea*, so *Pseudoleskea artariae* cannot be the sole representative of the genus. Therefore we return this taxon to the genus *Pseudoleskeopsis* (placed by Frey and Stech 2009 in Leskeaceae) pending further studies.

[451] Molecular studies suggest that *Pseudoleskea* and *Ptychodium* should be included in *Lescuraea* (Gardiner et al. 2005, Ignatov et al. 2007).

[452] Eckel (2012) proposed that *Elodium* (Sull.) Austin take the place of *Helodium*, on the basis of precedence. However, preliminary research by M. Ignatov indicates that North American and European material is not necessarily congeneric. Globally, there are (traditionally) three species commonly placed in the genus *Helodium*, but they are probably unrelated. As the name *Helodium* is in common usage, it is retained pending further studies.

1 ***H. blandowii*** (F.Weber & D.Mohr) Warnst. [*Elodium blandowii* (F.Weber & D.Mohr) Eckel]

231 ***Pelekium*** Mitt.
1 ***P. atlanticum*** (Hedenäs) Hedenäs
2 ***P. minutulum*** (Hedw.) Touw

232 ***Thuidiopsis*** (Broth.) M.Fleisch.
1 ***T. sparsa*** (Hook.f. & Wilson) Broth.

233 ***Thuidium*** Bruch & Schimp.
1 ***T. assimile*** (Mitt.) A.Jaeger
2 ***T. delicatulum*** (Hedw.) Schimp.
3 ***T. recognitum*** (Hedw.) Lindb.
4 ***T. tamariscinum*** (Hedw.) Schimp.

Brachytheciaceae Schimp.
Eurhynchioideae Milde

234 ***Eurhynchium*** Bruch & Schimp.
1 ***E. angustirete*** (Broth.) T.J.Kop.
2 ***E. striatum*** (Hedw.) Schimp.

235 ***Palamocladium*** M.Fleisch.
1 ***P. euchloron*** (Müll.Hal.) Wijk & Margad.

236 ***Plasteurhynchium*** M.Fleisch.
1 ***P. meridionale*** (Schimp.) M.Fleisch.
2 ***P. striatulum*** (Spruce) M.Fleisch.

237 ***Pseudoscleropodium*** (Limpr.) M.Fleisch.
1 ***P. purum*** (Hedw.) M.Fleisch.

238 ***Rhynchostegium*** Bruch & Schimp. [*Platyhypnidium* M.Fleisch.] [453]
1 ***R. alopecuroides*** (Brid.) A.J.E.Sm. [*Platyhypnidium lusitanicum* (Schimp.) Ochyra & Bedn.-Ochyra, *Platyhypnidium mutatum* Ochyra & Vanderp.] [454]
2 ***R. confertum*** (Dicks.) Schimp.
3 ***R. confusum*** K.Cezón, J.Muñoz, Hedenäs & Huttunen [455]
4 ***R. megapolitanum*** (Blandow ex F.Weber & D.Mohr) Schimp.
5 ***R. murale*** (Hedw.) Schimp. [*Rhynchostegium arcticum* (I.Hagen) Ignatov & Huttunen] [456]
6 ***R. riparioides*** (Hedw.) Cardot [*Platyhypnidium grolleanum* Ochyra & Bedn.-Ochyra, *Platyhypnidium torrenticola* (Ochyra, C.Schmidt & Bültmann) Ochyra & Bedn.-Ochyra] [457]

[453] Molecular studies have shown that the genus *Platyhypnidium* is not sustainable, with all the European species correctly placed in *Rhynchostegium* (Huttunen and Ignatov 2010).
[454] The generic placement of *Rhynchostegium alopecuroides* was confirmed using molecular techniques by Huttunen and Ignatov (2010). Molecular studies have shown that *Platyhypnidium mutatum* is deeply nested within *Rhynchostegium alopecuroides*, although a formal synonymy was not made (Hutsemékers et al. 2012).
[455] *Rhynchostegium confusum* was described from the Iberian Peninsula by Cezón et al. (2010).
[456] Recent molecular work by M. Ignatov suggests that *Rhynchostegium arcticum* should be treated as a synonym of *Rhynchostegium murale*.

7 ***R. rotundifolium*** (Scop. ex Brid.) Schimp.
8 ***R. strongylense*** (Bott.) W.R.Buck & Privitera

239 ***Scorpiurium*** Schimp.
1 ***S. circinatum*** (Bruch) M.Fleisch. & Loeske
2 ***S. deflexifolium*** (Solms) M.Fleisch. & Loeske
3 ***S. sendtneri*** (Schimp.) M.Fleisch.

Helicodontoideae M.Fleisch.

240 ***Cirriphyllum*** Grout
1 ***C. crassinervium*** (Taylor) Loeske & M.Fleisch.
2 ***C. piliferum*** (Hedw.) Grout

241 ***Clasmatodon*** Hook.f. & Wilson
1 ***C. parvulus*** (Hampe) Sull. [458]

242 ***Hedenasiastrum*** Ignatov & Vanderp. [459]
1 ***H. percurrens*** (Hedenäs) Ignatov & Vanderp. [*Brachythecium percurrens* Hedenäs]

243 ***Helicodontium*** Schwägr.
1 ***H. capillare*** (Hedw.) A.Jaeger

244 ***Microeurhynchium*** Ignatov & Vanderp. [460]
1 ***M. pumilum*** (Wilson) Ignatov & Vanderp. [*Oxyrrhynchium pumilum* (Wilson) Loeske]

245 ***Nobregaea*** Hedenäs
1 ***N. latinervis*** Hedenäs

246 ***Oxyrrhynchium*** (Schimp.) Warnst.
1 ***O. hians*** (Hedw.) Loeske
2 ***O. schleicheri*** (R.Hedw.) Röll
3 ***O. speciosum*** (Brid.) Warnst.

247 ***Pseudorhynchostegiella*** Ignatov & Vanderp. [461]
1 ***P. duriaei*** (Mont.) Ignatov & Vanderp. [*Rhynchostegiella durieui* (Mont.) P.Allorge & Perss.]

248 ***Rhynchostegiella*** (Schimp.) Limpr.
1 ***R. azorica*** Hedenäs & Vanderp. [462]
2 ***R. bourgaeana*** (Mitt.) Broth.
3 ***R. curviseta*** (Brid.) Limpr.
4 ***R. litorea*** (De Not.) Limpr. [*Rhynchostegiella tenella* var. *meridionalis* (Boulay) Zodda] [463]

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[457] *Platyhypnidium grolleanum* was regarded as a rare mutation of *Rhynchostegium riparioides* by Kučera et al. (2012). Molecular studies have shown that *Platyhypnidium torrenticola* is deeply nested within *Rhynchostegium riparioides*, although a formal synonymy was not made (Hutsemékers et al. 2012).
[458] *Clasmatodon parvulus* is re-admitted into the European flora following the revision of an old herbarium specimen (collected in Germany in 1851) by Müller (2007). It has not been refound more recently.
[459] *Hedenasiastrum* was described on molecular grounds (Aigoin et al. 2009).
[460] *Microeurhynchium* was described on molecular grounds (Aigoin et al. 2009).
[461] *Pseudorhynchostegiella* was described on molecular grounds (Aigoin et al. 2009).
[462] *Rhynchostegiella azorica* is an Azorean endemic described by Vanderpoorten et al. (2015).
[463] The synonymy of *Rhynchostegiella tenella* var. *meridionalis* with *Rhynchostegiella litorea* follows Guerra et al. (2014) and Patiño et al. (2017).

5 ***R. pseudolitorea*** Hedenäs & J.Patiño [464]
6 ***R. tenella*** (Dicks.) Limpr.
7 ***R. teneriffae*** (Mont.) Dirkse & Bouman [*Rhynchostegiella jacquinii* (Garov.) Limpr., *Rhynchostegiella macilenta* (Renauld & Cardot) Cardot, *Rhynchostegiella teesdalei* (Schimp.) Limpr.] [465]
8 ***R. trichophylla*** Dirkse & Bouman
9 ***R. tubulosa*** Hedenäs & J.Patiño [466]

Brachythecioideae Lotsy

249 ***Brachytheciastrum*** Ignatov & Huttunen
1 ***B. collinum*** (Schleich. ex Müll.Hal.) Ignatov & Huttunen [*Brachytheciastrum fendleri* auct. eur., non (Sull.) Ochyra & Żarnowiec] [467]
2 ***B. dieckei*** (Röll) Ignatov & Huttunen
3 ***B. olympicum*** (Jur.) Vanderp. et al.
4 ***B. salicinum*** (Schimp.) J.D.Orgaz, M.J.Cano & J.Guerra [*Brachytheciastrum velutinum* var. *salicinum* (Schimp.) Ochyra & Żarnowiec] [468]
5 ***B. trachypodium*** (Brid.) Ignatov & Huttunen
6 ***B. velutinum*** (Hedw.) Ignatov & Huttunen [*Brachytheciastrum vanekii* (Šmarda) Ochyra & Żarnowiec, *Brachytheciastrum velutinum* var. *vagans* (Milde) Ochyra & Żarnowiec] [469]

250 ***Brachythecium*** Schimp.
1 ***B. albicans*** (Hedw.) Schimp.
2 ***B. buchananii*** (Hook.) A.Jaeger [470]
3 ***B. campestre*** (Müll.Hal.) Schimp.
4 ***B. capillaceum*** (F.Weber & D.Mohr) Giacom. [*Brachythecium rotaeanum* De Not.] [471]
5 ***B. cirrosum*** (Schwägr.) Schimp.
6 ***B. erythrorrhizon*** Schimp. [*Brachythecium erythrorrhizon* subsp. *asiaticum* Ignatov, *Brachythecium erythrorrhizon* subsp. *erythrorrhizon* var. *thedenii* (Schimp.) Lindb.] [472]

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[464] *Rhynchostegiella pseudolitorea* is a Macaronesian endemic described by Patiño et al. (2017).
[465] *Rhynchostegiella macilenta* was synonymised with *R. teneriffae* by Patiño et al. (2017). The difficulties with *Rhynchostegiella jacquinii* and *Rhynchostegiella teesdalei* were discussed by Patiño et al. (2017), who listed them as doubtfully synonymous with *Rhynchostegiella teneriffae*. We continue to treat them as synonyms pending further work.
[466] *Rhynchostegiella tubulosa* is an eastern Mediterranean species described by Patiño et al. (2017), and subsequently also found in Portugal (Ellis et al. 2019).
[467] All European records of *Brachytheciastrum fendleri* are *Brachytheciastrum collinum* (Orgaz et al. 2013). *Brachytheciastrum fendleri* (Sull.) Ochyra & Żarnowiec is a North American species.
[468] *Brachytheciastrum salicinum* is reinstateded as a species, as it is significantly different from *Brachytheciastrum velutinum* morphologically, molecularly and ecologically (D. Orgaz pers. comm. 2018).
[469] *Brachytheciastrum vanekii* and *Brachytheciastrum velutinum* var. *vagans* (the latter known only from Poland) are synonymised with *Brachytheciastrum velutinum*, as they do not differ either morphologically or molecularly (J. Kučera and D. Orgaz pers. comm. 2018).
[470] *Brachythecium buchananii* is an essentially Asiatic species that also occurs on the European side of the Ural mountains (Ignatov and Milyutina 2010).
[471] *Brachythecium capillaceum* is most likely the earlier name for *Brachythecium rotaeanum*, although additional study is needed to confirm this.
[472] In reference to *Brachythecium erythrorrhizon* subsp. *asiaticum*, Ignatov and Milyutina (2010) observed, "…too broad variation in plant size in Eurasia and North America, making [it] very difficult to segregate

7 ***B. funkii*** Schimp. [473]
8 ***B. geheebii*** Milde
9 ***B. glareosum*** (Bruch ex Spruce) Schimp.
10 ***B. japygum*** (Głow.) Köckinger & Jan Kučera [474]
11 ***B. laetum*** (Brid.) Schimp.
12 ***B. mildeanum*** (Schimp.) Schimp.
13 ***B. novae-angliae*** (Sull. & Lesq.) A.Jaeger [*Brachythecium scabridum* (Lindb.) M.Li & Y.F.Wang, *Bryhnia scabrida* (Lindb.) Kaurin; *Bryhnia novae-angliae* (Sull. & Lesq.) Grout] [475]
14 ***B. rivulare*** Schimp.
15 ***B. rutabulum*** (Hedw.) Schimp.
a var. ***atlanticum*** Hedenäs
b var. ***rutabulum***
16 ***B. salebrosum*** (Hoffm. ex F.Weber & D.Mohr) Schimp.
17 ***B. tauriscorum*** Molendo [*Brachythecium coruscum* I.Hagen] [476]
18 ***B. tenuicaule*** (Spruce) Kindb. [*Rhynchostegiella tenuicaulis* (Spruce) Kartt.] [477]
19 ***B. tommasinii*** (Sendtn. ex Boulay) Ignatov & Huttunen
20 ***B. turgidum*** (Hartm.) Kindb.
21 ***B. udum*** I.Hagen [*Brachythecium mildeanum* var. *udum* (I.Hagen) Mönk.] [478]

251 ***Eurhynchiastrum*** Ignatov & Huttunen
1 ***E. diversifolium*** (Schimp.) J.Guerra [*Eurhynchiastrum pulchellum* var. *diversifolium* (Schimp.) Ochyra & Żarnowiec] [479]
2 ***E. pulchellum*** (Hedw.) Ignatov & Huttunen [*Eurhynchiastrum pulchellum* var. *praecox* (Hedw.) Ochyra & Żarnowiec] [480]

252 ***Homalothecium*** Schimp.
1 ***H. aureum*** (Spruce) H.Rob.
2 ***H. lutescens*** (Hedw.) H.Rob.
a var. ***fallax*** H.Philib. ex Schimp.
b var. ***lutescens***
3 ***H. mandonii*** (Mitt.)Geh. [481]
4 ***H. meridionale*** (M.Fleisch. & Warnst.) Hedenäs [482]

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this subspecies." Neither *Brachythecium erythrorrhizon* subsp. *asiaticum* nor subsp. *erythrorrhizon* var. *thedenii* are now considered worthy of recognition at any level.

[473] *Brachythecium funkii* was segregated from *Brachythecium cirrosum* on the basis of molecular evidence (Köckinger and Kučera 2016).

[474] *Brachythecium japygum* was segregated from *Brachythecium cirrosum* on the basis of molecular evidence (Köckinger and Kučera 2016).

[475] The Eurasian *Brachythecium scabridum* was synonymised with the North American *Brachythecium novae-angliae* by Huttunen et al. (2015), as no significant differences could be found.

[476] *Brachythecium tauriscorum* is an older name for *B. coruscum* (Hedenäs 2017b).

[477] Molecular work showed *Brachythecium tenuicaule* to be closely related to *Brachythecium tommasinii* (Köckinger and Kučera 2016).

[478] *Brachythecium udum* was treated as a variety of *Brachythecium mildeanum* (Podpera 1954, Hill et al. 2006), but Ignatov and Milyutina (2010) found it to be more closely related to *Brachythecium turgidum*. Sporophytes and male gametangia remain unknown, and it needs further study to determine whether it is a good species or an extreme phenotype in *the Brachythecium salebrosum-Brachythecium turgidum* complex growing in wet northern environments.

[479] *Eurhynchiastrum diversifolium* was raised to species level by Guerra (2016).

[480] The treatment of *Eurhynchiastrum pulchellum* follows Guerra (2016).

[481] *Homalothecium mandonii* was segregated from *H. sericeum* on the basis of molecular and morphological evidence (Hedenäs et al. 2014).

5 ***H. philippeanum*** (Spruce) Schimp.
6 ***H. sericeum*** (Hedw.) Schimp.

253 ***Kindbergia*** Ochyra
1 ***K. praelonga*** (Hedw.) Ochyra

254 ***Myuroclada*** Besch.
1 ***M. longiramea*** (Müll.Hal.) M.Li, Y.-F.Wang, Ignatov & Huttunen [483]
2 ***M. maximowiczii*** (G.G.Borshch.) Steere & W.B.Schofield

255 ***Sciuro-hypnum*** (Hampe) Hampe
1 ***S. curtum*** (Lindb.) Ignatov [484]
2 ***S. dovrense*** (Limpr.) Draper & Hedenäs [485]
3 ***S. flotowianum*** (Sendtn.) Ignatov & Huttunen
4 ***S. glaciale*** (Schimp.) Ignatov & Huttunen
5 ***S. latifolium*** (Kindb.) Ignatov & Huttunen
6 ***S. oedipodium*** (Mitt.) Ignatov & Huttunen
7 ***S. ornellanum*** (Molendo) Ignatov & Huttunen
8 ***S. plumosum*** (Hedw.) Ignatov & Huttunen
9 ***S. populeum*** (Hedw.) Ignatov & Huttunen
10 ***S. reflexum*** (Starke) Ignatov & Huttunen
11 ***S. starkei*** (Brid.) Ignatov & Huttunen
12 ***S. tromsoeense*** (Kaurin & Arnell) Draper & Hedenäs [486]

256 ***Scleropodium*** Bruch & Schimp.
1 ***S. cespitans*** (Wilson ex Müll.Hal.) L.F.Koch
2 ***S. touretii*** (Brid.) L.F.Koch

Hypnaceae Schimp.

257 ***Hypnum*** Hedw. [487]
1 ***H. andoi*** A.J.E.Sm.
2 ***H. cupressiforme*** Hedw.
a var. ***cupressiforme***
b var. ***filiforme*** Brid. [488]
c var. ***heseleri*** (Ando & Higuchi) M.O.Hill
d var. ***lacunosum*** Brid.
e var. ***subjulaceum*** Molendo [*Hypnum subcomplanatum* Hedenäs, Schlesak & D.Quandt, *nom. illeg*., *Hypnum subjulaceum* (Molendo) Hedenäs, Schlesak & D.Quandt] [489]

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[482] *Homalothecium meridionale* was segregated from *H. sericeum* on the basis of molecular and morphological evidence (Hedenäs et al. 2014).
[483] The status of *Myuroclada longiramea* in Europe was clarified by Ignatov et al. (2015).
[484] *Sciuro-hypnum curtum* was restored from synonymy with *Sciuro-hypnum oedipodium* by Ignatov and Milyutina (2007). It is a widespread species in Europe, whereas *Sciuro-hypnum oedipodium*, which is primarily a western North American species, is very rare, with just a few records from eastern Europe.
[485] *Sciuro-hypnum dovrense* was removed from synonymy with *Brachythecium glaciale* by Draper and Hedenäs (2009).
[486] *Sciuro-hypnum tromsoeense* was removed from synonymy with *Brachythecium starkei* by Draper and Hedenäs (2008).
[487] The treatment of *Hypnum* follows Schlesak et al. (2018), apart from *Hypnum cupressiforme* var. *subjulaceum* (see footnote below).
[488] *Hypnum cupressiforme* var. *filiforme* may well be nothing more than an environmental modification but is retained as a variety until its position is clarified.

3 ***H. jutlandicum*** Holmen & E.Warncke
4 ***H. resupinatum*** Taylor [*Hypnum cupressiforme* var. *resupinatum* (Taylor) Schimp.] [490]
5 ***H. uncinulatum*** Jur.

Callicladiaceae Jan Kučera & Ignatov [491]

258 ***Callicladium*** H.A.Crum
1 ***C. haldanianum*** (Grev.) H.A.Crum
2 ***C. imponens*** (Hedw.) Hedenäs, Schlesak & D.Quandt [*Hypnum imponens* Hedw.] [492]

Taxiphyllaceae Ignatov [493]

259 ***Taxiphyllum*** M.Fleisch.
1 ***T. densifolium*** (Lindb. ex Broth.) Reimers
2 ***T. wissgrillii*** (Garov.) Wijk & Margad.

Pylaisiadelphaceae Goffinet & W.R.Buck

260 ***Brotherella*** M.Fleisch.
1 ***B. lorentziana*** (Molendo ex Lorentz) Loeske ex M.Fleisch. [*Brotherella henonii* auct.eur., non (Duby) M.Fleisch.[494]

261 ***Heterophyllium*** (Schimp.) Kindb.
1 ***H. affine*** (Hook.) M.Fleisch.

262 ***Isopterygium*** Mitt.
1 ***I. tenerum*** (Sw.) Mitt.

263 ***Platygyrium*** Bruch & Schimp.
1 ***P. repens*** (Brid.) Schimp.

Jocheniaceae Jan Kučera & Ignatov [495]

264 ***Jochenia*** Hedenäs, Schlesak & D.Quandt [496]
1 ***J. pallescens*** (Hedw.) Hedenäs, Schlesak & D.Quandt [*Hypnum pallescens* (Hedw.) P.Beauv., *Hypnum reptile* Michx., *Hypnum pallescens* var. *reptile* (Michx.) Husn.]

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[489] *Hypnum subjulaceum* was published by Schlesak et al. (2018) as *Hypnum subcomplanatum* rather than *Hypnum subjulaceum* because the latter was thought to be blocked by the name *Hypnum subjulaceum* Besch. However, the latter name was not validly published, so its use at species level is not blocked. This was corrected by Schlesak et al. (2019). Later, Kučera et al. (2019) found that *Hypnum subjulaceum* formed a supported lineage within *Hypnum cupressiforme* s.lat., and so it was returned to varietal status.

[490] *Hypnum resupinatum* is treated at species level, as it is usually distinct morphologically and has a distinct geographical distribution. However, according to current knowledge, it might equally well be treated as a variety of *Hypnum cupressiforme*, as in Guerra (2018). Ongoing molecular studies should clarify the situation.

[491] The new family Callicladiaceae was established by Kučera et al. (2019) on molecular grounds.

[492] Molecular evidence places *Hypnum imponens* in *Callicladium* (Schlesak et al. 2018).

[493] The family Taxiphyllaceae was established by Ignatov et al. (2012) to accommodate *Taxiphyllum*.

[494] Frahm (2013) synonymised *Brotherella lorentziana* with *Brotherella henonii* (Duby) M.Fleisch., an east Asian species, but a genetic review is still pending. We therefore continue to accept *Brotherella lorentziana* as valid.

[495] The new family Jocheniaceae was established by Kučera et al. (2019) on molecular evidence.

[496] Schlesak et al. (2018) established the genus *Jochenia* for *Hypnum pallescens*.

2 ***J. protuberans*** (Brid.) Jan Kučera & Ignatov [*Hypnum pallescens* var. *protuberans* (Brid.) Austin, *Hypnum protuberans* Brid.][497]

Stereodontaceae Hedenäs, Schlesak & D.Quandt[498]

265 ***Stereodon*** (Brid.) Mitt. [499]
- 1 ***S. aemulans*** (Breidl.) Broth. [*Hypnum aemulans* Breidl.] [500]
- 2 ***S. callichrous*** (Brid.) Lindb. [*Hypnum callichroum* Brid.]
- 3 ***S. hamulosus*** (Schimp.) Lindb. [*Hypnum hamulosum* Schimp.]
- 4 ***S. holmenii*** (Ando) Ignatov & Igantova [*Hypnum holmenii* Ando]
- 5 ***S. pratensis*** (W.D.J.Koch ex Spruce) Warnst. [*Breidleria pratensis* (W.D.J.Koch ex Spruce) Loeske]
- 6 ***S. subimponens*** (Lesq.) Broth. [*Hypnum subimponens* Lesq.]

Pylaisiaceae Schimp.

266 ***Aquilonium*** Hedenäs, Schlesak & D.Quandt [501]
- 1 ***A. plicatulum*** (Lindb.) Hedenäs, Schlesak & D.Quandt [*Hypnum plicatulum* (Lindb.) A.Jaeger]

267 ***Buckia*** D.Rios, M.T.Gallego & J.Guerra [502]
- 1 ***B. vaucheri*** (Lesq.) D.Rios, M.T.Gallego & J.Guerra [*Hypnum vaucheri* Lesq.]

268 ***Calliergonella*** Loeske
- 1 ***C. cuspidata*** (Hedw.) Loeske
- 2 ***C. lindbergii*** (Mitt.) Hedenäs

269 ***Homomallium*** (Schimp.) Loeske
- 1 ***H. incurvatum*** (Schrad. ex Brid.) Loeske

270 ***Pseudohygrohypnum*** Kanda [503]
- 1 ***P. eugyrium*** (Schimp.) Kanda [*Hygrohypnum eugyrium* (Schimp.) Broth.]
- 2 ***P. fertile*** (Sendtn.) Jan Kučera & Ignatov [*Hypnum fertile* Sendtn., *Stereodon fertilis* (Sendtn.) Lindb.] [504]

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[497] Using molecular data, Kučera et al. (2019) found that *Jochenia protuberans* was consistently different from *Jochenia pallescens*. Although this taxon has not often been recognised even at varietal level, there is now sufficient evidence to treat it as a species. Ando (1973) correctly distinguished between the taxa. although he treated *Jochenia protruberans* only as a form of *Jochenia pallescens*. His synonymy of *Hypnum reptile* with *Hypnum pallescens* and clarification of misunderstanding the type of *Leskea pallescens* Hedw., introduced by the authors of Bryologia Europaea, is followed here.

[498] The family Stereodontaceae was established by Schlesak et al. (2018) to legitimate the high statistical support for the clade including *Stereodon*.

[499] The treatment of *Stereodon* follows Schlesak et al. (2018) and Kučera et al. (2019).

[500] *Hypnum aemulans* has been treated as a synonym of *Stereodon hamulosus* (*Hypnum hamulosum*) by most European authors, and was therefore omitted by Hill et al. (2006). No useful DNA could be extracted from this species during the recent revision of European *Hypnum* by Schlesak et al. 2018, so its generic placement remains uncertain. However, morphological evidence suggests that it should be located in *Stereodon*.

[501] The genus *Aquilonium* was established by Schlesak et al. (2018) to accommodate, among other species, *Hypnum plicatulum*.

[502] The genus *Buckia* was established by Câmara et al. (2018) to accommodate *Hypnum vaucheri*.

[503] *Pseudohygrohypnum*, described by Kanda (1976 (1977)), is accepted, as a broad concept of *Hygrohypnum* can no longer be maintained.

[504] Kučera et al. (2019) placed *Hypnum fertile* in *Pseudohygrohypnum* on molecular evidence.

3 ***P. subeugyrium*** (Renauld & Cardot) Ignatov & Ignatova [*Hygrohypnum subeugyrium* (Renauld & Cardot) Broth.] [505]

271 ***Pseudostereodon*** (Broth.) M.Fleisch. [506]
1 ***P. procerrimus*** (Molendo) M.Fleisch. [*Ctenidium procerrimum* (Molendo) Lindb., *Hypnum procerrimum* Molendo]

272 ***Ptilium*** De Not. [507]
1 ***P. crista-castrensis*** (Hedw.) De Not.

273 ***Pylaisia*** Schimp.
1 ***P. polyantha*** (Hedw.) Schimp.
2 ***P. selwynii*** Kindb.

274 ***Roaldia*** P.E.A.S.Câmara & Carv.-Silva [508]
1 ***R. dolomitica*** (Milde) Hedenäs, Schlesak & D.Quandt [*Hypnum revolutum* (Mitt.) Lindb. var. *dolomiticum* (Milde) Mönk.]
2 ***R. revoluta*** (Mitt.) P.E.A.S.Câmara & M.Carvalho-Silva [*Hypnum revolutum* (Mitt.) Lindb.]
3 [509]

275 ***Vesicularia*** (Müll.Hal.) Müll.Hal. [510]
1 ***V. reimersiana*** Bizot & P.de la Varde

Sematophyllaceae Broth.

276 ***Sematophyllum*** Mitt.
1 ***S. adnatum*** (Michx.) E.Britton
2 ***S. demissum*** (Wilson) Mitt.
3 ***S. substrumulosum*** (Hampe) E.Britton

Hylocomiaceae M.Fleisch.

277 ***Hageniella*** Broth. [511]
1 ***H. micans*** (Mitt.) B.C.Tan & Y.Jia

278 ***Hylocomiadelphus*** Ochyra & Stebel [512]
1 ***H. triquetrus*** (Hedw.) Ochyra & Stebel [*Rhytidiadelphus triquetrus* (Hedw.) Warnst.]

279 ***Hylocomiastrum*** Broth.
1 ***H. pyrenaicum*** (Spruce) M.Fleisch.
2 ***H. umbratum*** (Hedw.) M.Fleisch.

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[505] *Hygrohypnum subeugyrium* was transferred to *Pseudohygrohypnum* by Ignatov and Ignatova (2004)
[506] *Pseudostereodon* was re-established by Câmara et al. (2018).
[507] The placement of *Ptilium* in the Pylaisiaceae is a temporary soluation, as its position remains uncertain until further research takes place.
[508] The genus *Roaldia* was established to accommodate *Hypnum revolutum* s.lat. (Câmara et al. 2018).
[509] While *Roaldia dolomitica* is regarded as 'mere morphological variation' by Câmara et al. (2018), it is treated as a full species by Schlesak et al. (2018). The latter view is supported by Kučera et al. (2019).
[510] The placement of *Vesicularia* in Pylaisiaceae follows Ignatov et al. (2007).
[511] Although placed in Hylocomiaceae by Frey and Stech (2009), *Hageniella* is probably best placed in Sematophyllaceae.
[512] *Hylacomiadelphus* was pubished by Ochyra and Stebel (2008) to accommodate *Rhytidiadelphus triquetrus*. This was not widely accepted, but recent molecular work (Ignatov et al. 2019a) has supported the idea.

280 ***Hylocomium*** Bruch & Schimp.
1 ***H. splendens*** (Hedw.) Schimp.

281 ***Loeskeobryum*** Broth.
1 ***L. brevirostre*** (Brid.) M.Fleisch.

282 ***Pleurozium*** Mitt.
1 ***P. schreberi*** (Willd. ex Brid.) Mitt.

283 ***Rhytidiadelphus*** (Limpr.) Warnst.
1 ***R. loreus*** (Hedw.) Warnst.
2 ***R. squarrosus*** (Hedw.) Warnst.
3 ***R. subpinnatus*** (Lindb.) T.J.Kop.

Rhytidiaceae Broth.

284 ***Rhytidium*** (Sull.) Kindb.
1 ***R. rugosum*** (Hedw.) Kindb.

Entodontaceae Kindb.

285 ***Entodon*** Müll.Hal.
1 ***E. challengeri*** (Paris) Cardot
2 ***E. cladorrhizans*** (Hedw.) Müll.Hal.
3 ***E. concinnus*** (De Not.) Paris
4 ***E. schleicheri*** (Schimp.) Demet.

Cryphaeaceae Schimp.

286 ***Cryphaea*** D.Mohr
1 ***C. heteromalla*** (Hedw.) D.Mohr

287 ***Dendrocryphaea*** Broth.
1 ***D. lamyana*** (Mont.) P.Rao

Leucodontaceae Schimp.

288 ***Leucodon*** Schwägr.
1 ***L. canariensis*** (Brid.) Schwägr.
2 ***L. flagellaris*** Lindb. ex Broth. [513]
3 ***L. immersus*** Lindb. [514]
4 ***L. pendulus*** Lindb.
5 ***L. sciuroides*** (Hedw.) Schwägr. [*Leucodon sciuroides* var. *morensis* (Schwägr.) De Not.] [515]
6 ***L. treleasei*** (Cardot) Paris

289 ***Nogopterium*** Crosby & W.R.Buck [*Pterogonium* Sw. *nom. illeg.*] [516]
1 ***N. gracile*** (Hedw.) Crosby & W.R.Buck [*Pterogonium gracile* (Hedw.) Sm.]

Antitrichiaceae Ignatov & Ignatova

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[513] Werner et al. (2015) confirmed the status of *Leucodon flagellaris*.
[514] Werner et al. (2015) confirmed the status of *Leucodon immersus*.
[515] Werner et al. (2015) found no substantial basis for retaining *Leucodon sciuroides* var. *morensis*.
[516] Although familiar through long use, *Pterogonium* is an illegitimate name. It was replaced by *Nogopterium* (an anagram) by Crosby and Buck (2011).

290 ***Antitrichia*** Brid.
- 1 ***A. californica*** Sull.
- 2 ***A. curtipendula*** (Hedw.) Brid.

Neckeraceae Schimp.

291 ***Alleniella*** S.Olsson, Enroth & D.Quandt [517]
- 1 ***A. besseri*** (Lobarz.) S.Olsson, Enroth & D.Quandt [*Neckera besseri* (Lobarz.) Jur.]
- 2 ***A. complanata*** (Hedw.) S.Olsson, Enroth & D.Quandt [*Neckera complanata* (Hedw.) Huebener]

292 ***Exsertotheca*** S.Olsson, Enroth & D.Quandt [518]
- 1 ***E. baetica*** (J.Guerra) Draper, González-Mancebo, O.Werner, J.Patiño & Ros [*Neckera baetica* J.Guerra] [519]
- 2 ***E. crispa*** (Hedw.) S.Olsson, Enroth & D.Quandt [*Neckera crispa* Hedw.]
- 3 ***E. intermedia*** (Brid.) S.Olsson, Enroth & D.Quandt [*Neckera intermedia* Brid.]

293 ***Homalia*** (Brid.) Bruch & Schimp.
- 1 ***H. lusitanica*** Schimp.
- 2 ***H. trichomanoides*** (Hedw.) Brid.

294 ***Iwatsukiella*** W.R.Buck & H.A.Crum [520]
- 1 ***I. leucotricha*** (Mitt.) W.R.Buck & H.A.Crum

295 ***Leptodon*** D.Mohr
- 1 ***L. corsicus*** Enroth, Sotiaux, D.Quandt & Vanderp. [521]
- 2 ***L. longisetus*** (Mont.) Enroth [*Cryptoleptodon longisetus* (Mont.) Enroth] 522
- 3 ***L. smithii*** (Hedw.) F.Weber & D.Mohr

296 ***Neckera*** Hedw.
- 1 ***N. cephalonica*** Jur. & Unger
- 2 ***N. menziesii*** Drumm.
- 3 ***N. oligocarpa*** Bruch
- 4 ***N. pennata*** Hedw.
- 5 ***N. pumila*** Hedw.

297 ***Pseudanomodon*** (Limpr.) Ignatov & Fedosov [523]
- 1 ***P. attenuatus*** (Hedw.) Ignatov & Fedosov [*Anomodon attenuatus* (Hedw.) Huebener]

298 ***Thamnobryum*** Nieuwl.
- 1 ***T. alopecurum*** (Hedw.) Gangulee
- 2 ***T. angustifolium*** (Holt) Nieuwl. [524]

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[517] *Alleniella* was segregated from *Neckera* by Olsson et al. (2011).
[518] *Exsertotheca* was *segregated* from *Neckera* by Draper et al. (2011).
[519] *Neckera baetica* was described by Guerra et al. (2010b) and transferred to *Exsertotheca* by Olsson et al. (2011).
[520] *Iwatsukiella* has been placed in the Heterocladiaceae Ignatov & Ignatova, but this family name is illegitimate, having previously been used for a family of algae. Therefore the genus is temporarily placed in Neckeraceae until another name is substituted
[521] *Leptodon corsicus*, apparently a Corsican endemic, was described by Sotiaux et al. (2009).
[522] *Cryptoleptodon longisetus* was transferred to *Leptodon* by Olsson et al. (2011).
[523] *Pseudanomodon* was established for *Anomodon attenuatus* after molecular studies showed it to be deeply nested in the Neckeraceae (Ignatov et al. 2019b).

3 ***T. cataractarum*** N.G.Hodgetts & Blockeel [525]
4 ***T. fernandesii*** Sérgio [526]
5 ***T. maderense*** (Kindb.) Hedenäs
6 ***T. neckeroides*** (Hook.) E.Lawton
7 ***T. rudolphianum*** Mastracci
8 ***T. subserratum*** (Hook. ex Harv.) Nog. & Z.Iwats. [527]

Heterocladiellaceae Ignatov & Fedosov [528]

299 ***Heterocladiella*** Ignatov & Fedosov
1 ***H. dimorpha*** (Brid.) Ignatov & Fedosov [*Heterocladium dimorphum* (Brid.) Schimp.]

Lembophyllaceae Broth.

300 ***Heterocladium*** Bruch & Schimp. [529]
1 ***H. flaccidum*** (Schimp.) A.J.E.Sm.
2 ***H. heteropterum*** (Brid.) Schimp.
3 ***H. wulfsbergii*** I.Hagen

301 ***Isothecium*** Brid.
1 ***I. algarvicum*** W.E.Nicholson & Dixon
2 ***I. alopecuroides*** (Lam. ex Dubois) Isov.
3 ***I. holtii*** Kindb.
4 ***I. interludens*** Stirt. [*Isothecium myosuroides* var. *brachythecioides* (Dixon) Braithw.] [530]
5 ***I. montanum*** Draper, Hedenäs, M.Stech, T.Lopes & Sim-Sim [531]

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[524] Furness and Gilbert (1980) showed that *Thamnobryum angustifolium* maintains its characters distinct from *Thamnobryum alopecurum* in culture. There are at least three distinct morphological features that distinguish this species from *Thamnobryum alopecurum.* Hodgetts and Blockeel (1992) considered it to be more closely related to *Thamnobryum cataractarum* and the Madeiran *Thamnobryum fernandesii* than to *Thamnobryum alopecurum*. However, more recent molecular work by Olsson et al. (2009) suggests that, while *Thamnobryum angustifolium* is undoubtedly a distinct entity morphologically, colonies of this plant (and of the other narrowly endemic *Thamnobryum* species) may originate from the surrounding subpopulations of *Thamnobryum alopecurum*. In this case, the two subpopulations of *Thamnobryum angustifolium* are independently derived from local *Thamnobryum alopecurum*, and have evolved convergently in response to the rheophilous habitat (Blockeel et al. 2014).

[525] Olsson et al. (2009) used molecular techniques to suggest that, like *Thamnobryum angustifolium*, *Thamnobryum cataractarum* may be a local derivative of *Thamnobryum alopecurum*, evolving convergently in response to its habitat (Blockeel et al. 2014).

[526] Recent molecular work by Olsson et al. (2009) suggests that while *Thamnobryum fernandesii* is a distinct entity, colonies may, like *Thamnobryum angustifolium* and *Thamnobryum cataractarum*, originate from surrounding colonies of *Thamnobryum alopecurum*.

[527] Köckinger et al. (2008), when reporting *Thamnobryum subserratum* from Austria, pointed out that it was first given for Europe by Mastracci (2003), in which Fig. 2 (l, m) was drawn from a collection from Latvia (Kurland, leg. Malta, Z.).

[528] The new family Heterocladiellaceae was proposed to accommodate *Heterocladium dimorphum*. The taxonomic position of this species is still uncertain, but the genetic differentiation was considered sufficient to place it in a separate genus and family close to Echinodiaceae, Lembophyllaceae and Neckeraceae (Ignatov et al. 2019b).

[529] *Heterocladium* has been placed in the Heterocladiaceae Ignatov & Ignatova, but this family name is illegitimate, having previously been used for a family of algae. It was temporarily placed in the Neckeraceae until molecular evidence showed that it is best placed in the Lembophyllaceae (Ignatov et al. 2019b).

[530] Hodgetts and Vanderpoorten (2018) returned *Isothecium myosuroides* var. *brachythecioides* to species level on the basis of molecular and morphological evidence.

6 ***I. myosuroides*** Brid. [*Isothecium myosuroides* subsp. *brevinerve* Kindb.] [532]
7 ***I. prolixum*** (Mitt.) M.Stech, Sim-Sim, Tangney & D.Quandt [*Echinodium prolixum* (Mitt.) Broth.] [533]

Echinodiaceae Broth.

302 ***Echinodium*** Jur.
1 ***E. renauldii*** (Cardot) Broth.
2 ***E. setigerum*** (Mitt.) Jur.
3 ***E. spinosum*** (Mitt.) Jur.

303 ***Pseudomalia*** Enroth [534]
1 ***P. webbiana*** (Mont.) Enroth [*Homalia webbiana* (Mont.) Schimp., *Neckera webbiana* (Mont.) Düll]

Myuriaceae M.Fleisch. [535]

304 ***Andoa*** Ochyra
1 ***A. berthelotiana*** (Mont.) Ochyra

305 ***Ctenidium*** (Schimp.) Mitt.
1 ***C. molluscum*** (Hedw.) Mitt. [536]

306 ***Hyocomium*** Bruch & Schimp.
1 ***H. armoricum*** (Brid.) Wijk & Margad.

307 ***Myurium*** Schimp.
1 ***M. hochstetteri*** (Schimp.) Kindb.

Anomodontaceae Kindb.

308 ***Anomodon*** Hook. & Taylor [*Anomodontella* Ignatov & Fedosov, *Anomodontopsis* Ignatov & Fedosov] [537]
1 ***A. longifolius*** (Schleich. ex Brid.) Hartm. [*Anomodontella longifolia* (Schleich. ex Brid.) Ignatov & Fedosov]
2 ***A. rugelii*** (Müll.Hal.) Keissl. [*Anomodontopsis rugelii* (Müll.Hal.) Ignatov & Fedosov]
3 ***A. tristis*** (Ces.) Sull. & Lesq. [*Haplohymenium triste* (Ces.) Kindb.]

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[531] *Isothecium montanum*, a Madeiran endemic, was described by Draper et al. (2015).
[532] The features characterising *Isothecium myosuroides* subsp. *brevinerve* are very plastic and have no taxonomic value. The authorship of this subspecies is 'Kindb.' rather than 'Lindb.', as it was listed in Hill et al. (2006): the basionym for the subspecies is *Isothecium myosuroides* subsp. *hylocomioides* Kindb. (Kindberg 1893).
[533] *Echinodium prolixum* was transferred to *Isothecium* by Stech et al. (2008).
[534] On the basis of molecular studies, *Pseudomalia* was established as a new genus in the Echinodiaceae to accommodate *Homalia webbiana* (Enroth et al. 2019), a species long suspected not to belong in the Neckeraceae (Olsson et al. 2009).
[535] *Andoa*, *Ctenidium* and *Myurium* form a well supported clade in Huttunen et al. (2012). Furthermore, these three genera plus *Hyocomium* form a clade in Cox et al. (2010).
[536] There continues to be no firm basis for any of the infraspecific taxa of *Ctenidium molluscum*, so the treatment of Hill et al. (2006) is continued.
[537] Ignatov et al. (2019b) established the genera *Anomodontopsis* (for *Anomodon rugelii*) and *Anomodontella* (for *Anomodon longifolius*), and resurrected *Haplohymenium* (for *Anomodon tristis*). Although Ignatov et al. (2019b) show different lineages 'within the Anomodontaceae', the same study gives support for a clade that includes all the species of *Anomodon* s.lat. except *Anomodon attenuatus*, so a relatively conservative approach is adopted here in order to avoid the unnecessary proliferation of small genera.

4 ***A. viticulosus*** (Hedw.) Hook. & Taylor

Taxa rejected from the covered area

The following taxa have been reported from the area but have been shown not to occur there. Taxa reported from 'Europe' without any further information and which are clearly errors are not included in the list below. There are about 150 liverwort names (mostly subspecific names) with types from Europe that have not been recognised recently, nor synonymized. Some of those names are so old that they may threaten accepted names if their true identity becomes known. Some of the names in *Jungermannia* were enumerated in Söderström et al. (2016).

Liverworts

Acrobolbus anisodontus (Hook.f. & Taylor) Briscoe [*Tylimanthus anisodontus* (Hook.f. & Taylor) Mitt.] was reported from Madeira by Stephani (1905) but rejected as *Acrobolbus madeirensis* by Grolle and Persson (1966), and from the Azores by Allorge and Allorge (1948) but rejected as *Acrobolbus azoricus.*

Acrobolbos ciliatus (Mitt.) Schiffn. is reported from Britain (coll. *D.G.Long 29767*, E) by Masuzaki et al. (2010) but this is an error for *Acrobolbus wilsonii* (D.G.Long, pers. comm.).

Acrobolbus laxus (Lehm. & Lindenb.) Briscoe is reported from the Azores and Madeira by Burghardt and Gradstein (2008) but their concept included *Acrobolbus azoricus* and *Acrobolbus madeirensis* to which the reports belong.

Asterella blumeana (Nees) Kachroo is a southeast Asian taxon reported as *Fimbraria blumeana* Nees from Italy by Tassi (1901) but rejected by Aleffi and Schumacker (1995).

Asterella elegans (Spreng.) Trevis. is a South American taxon reported from Corsica as *Fimbraria elegans* Spreng by Casares-Gil (1919) but this is rejected by Bischler and Jovet-Ast (1973).

Asterella marginata (Nees) S.W.Arnell was reported from Madeira as *Fimbraria marginata* Nees by Gottsche et al. (1846) but this must be rejected. It is a southern African taxon.

Asterella pringlei Underw. is an American taxon reported from Italy as *Fimbraria stahlii* Steph. by Tassi (1901) but this is rejected by Aleffi and Schumacker (1995).

Asterella tenella (L.) P.Beauv. is a North American taxon reported as *Fimbraria tenella* L. from several places in Europe during the 19th centuary, but all reports are rejected by Long (2006).

Asterella wallichiana (Lehm. & Lindenb.) Grolle is an E Asian taxon reported from Italy as *Fimbraria raddii* Corda ex Nees (type). However, the type is probably from Himalaya and certainly not from Europe (Long 2006).

Bazzania denudata (Lindenb. & Gottsche) Trevis. is a taxon from North America and East Asia reported many times from central and western Europe but rejected from here by Schuster (1969).

Blepharostoma arachnoideum M. Howe is a North American taxon reported from Polar Ural by Zinovjeva (1973) but rejected as *B. trichophyllum* subsp. *brevirete* by Konstantinova and Potemkin (1994).

Cephalozia lucens (A.Evans) Steph. is a taxon from Hawaii reported from Italy by Rhodegher (1896) but rejected by Aleffi (2005).

Cephaloziella mammillifera R.M.Schust. & Damsh. is an American taxon reported from 'Europe' by Stotler and Crandall-Stotler (2017). This taxon was treated as a

questioned synonym of *Cephaloziella varians* var. *scabra* by Damsholt (2002) and if this synonym is correct, the taxon does occur in Europe.

Cephaloziella verrucosa Steph. is a taxon from the Southern Hemisphere that has erroneously been reported from Svalbard (Bryhn 1909), probably due to nomenclatural confusion.

Cyathodium spurium (Dicks.) Lindb. ex Braithw. may be conspecific with *Cyathodium cavernarum* (Braithwaite 1878). The type specimen is from Scotland, but it is probably mislabelled as no *Cyathodium* is known from boreal Europe.

Frullania davurica Hampe ex Gottsche, Lindenb. & Nees. has been reported several times from Europe, mostly because it has sometimes included *Frullania jackii* as a subspecies [*F. davurica* subsp. *jackii* (Gottsche) S.Hatt.].

Frullania inflata Gottsche is shown to be a complex species confined in a restricted sense to North America while the European populations must be named *Frullania cleistostoma* (Mamontov et al. 2018a).

Frullania muscicola Steph. is an Asiatic taxon reported from Europe as a putative synonym (variety) of *F. cesatiana* (=*Frullania inflata;* see note under the latter).

Frullania obscurifolia Mitt. is an African taxon reported by Dirkse et al. (1993) but rejected as *Frullania azorica* by González-Mancebo et al. (2008).

Herbertus dicranus (Gottsche, Lindenb. & Nees) Trevis. has (sometimes as *Herbertus sakuraii* (Warnst.) S.Hatt.) been reported from Norway and Scotland (Konstantinova 2000a, Hodgetts 2003) due to the inclusion of the now rejected synonymy with *Herbertus borealis*. The unsupported mention of 'Madeira' (Juslén 2006) is an obvious error for Madagascar.

Heteroscyphus integrifolius (Lehm. & Lindenb.) Fulford is a taxon from South America reported from Italy by Rodegher (1896) but rejected by Aleffi (2005).

Jubula hutchinsiae subsp. *javanica* (Steph.) Verd. is an Asiatic taxon. It was supposed to be the subspecies occurring in Caucasus prior to the description of subsp. *caucasica*. It has also erroneously been reported from other parts of Europe and Macaronesia.

Jubula hutchinsiae subsp. *pennsylvanica* (Steph.) Verd. is the North American subspecies that has been reported erroneously from Ireland, France, Macaronesia and Caucasus.

Jungermannia exsertifolia Steph. is an East Asiatic species reported from Europe on the basis that it includes *Jungermannia eucordifolia* as a subspecies, but Mamontov et al. (2018b) showed that the latter deserves specific rank.

Kurzia makinoana (Steph.) Grolle is a species from North America and East Asia that has been reported from several places in Europe since Grolle (1963) included *K. sylvatica* as synonym. However, this synonymy was rejected by Grolle (1973).

Lejeunea laetevirens Nees & Mont. is a primarly South American taxon but with close affinity to *Lejeunea canariensis*. Unless conspecific with the latter, *Lejeunea laetevirens* is not found in Macaronesia.

Lophocolea humistrata (Hook.f. & Taylor) Gottsche, Lindenb. & Nees is endemic to St Helena but was noted also from Madeira by Stephani (1907).

Lophoziopsis propagulifera (Gottsche) Konstant. & Vilnet is a Southern Hemisphere taxon that was considered conspecific with *Lophoziopsis latifolia* by Bakalin (2005) but the synonymy was rejected by Köckinger (2017) and this is supported by ongoing unpublished molecular research by N. Konstantinova et al.

Metzgeria temperata Kuwah. is a primarily E Asiatic taxon that has been recorded from all around the northern Hemisphere, including Europe and Macaronesia. However,

the European and E Asiatic specimens are not identical (cf. Köckinger 2017) and for the present the name *Metzgeria consanguinea* is used (see note also under that name).

Microlejeunea diversiloba (Spruce) Müll.Frib. is an American taxon that was described from Mexico under the name *Lejeunea diversifolia* Gottsche and reported from Ireland by Spruce (1876a). However, there exists an older *Lejeunea diversifolia* Mitt. (from the Himalaya), and Spruce (1876b) changed the name to *Lejeunea diversiloba*. It was subsequently reported from the Azores and Ireland by Allorge and Persson (1938). Grolle (1975) concluded that the Irish material was not the same as the Mexican type and re-described it as *Lejeunea hibernica*. All reports outside America should belong here.

Plagiochila javanica (Sw.) Nees & Mont. is a taxon from southeast Asia that Gottsche et al. (1844) reported from the Canary Islands (leg. *Webb*) but this was rejected by Inoue (1969) who could not locate any specimen supporting the report.

Plagiochila patula (Sw.) Lindenb. is an American species reported from Canary Islands (Dirkse et al. 1993) and Madeira (Nieuwkoop and Arts 1995), both as *Plagiochila dubia* Lindenb. & Gottsche, but this was rejected as *Plagiochila virginica* by Heinrichs et al. (2002a).

Plagiochila uniformis Mitt. is a taxon from southeast Asia reported by Stephani (1903) as *Plagiochila ambagiosa* Mitt. from Ireland. Stephani's concept of *P. ambagiosa* was, however, not the same as the taxon described by Mitten, but rather belonging to *Plagiochila spinulosa.*

Porella navicularis (Lehm. & Lindenb.) Pfeiff. is an American taxon reported from several places in central Europe, mostly during the 19th century, but also a few times more recently.

Porella platyphylloidea (Schwein.) Lindb. is frequently reported from Europe. It has sometimes been considered synonymous with *Porella platyphylla* but the study by Heinrichs et al. (2011) shows that the European and American populations of *Porella platyphylla/platyphylloidea* are different and only *Porella platyphylla* occurs in Europe.

Riccia bullosa Link is described with two syntypes, one from South Africa and the other from Portugal. The lectotype is from South Africa and it is not conspecific with the European taxon (Grolle and Long 2000), the latter being *Exormotheca welwitschii*. All reports from Europe are based on this confusion.

Riccia concava Bisch. ex C.Krauss is a taxon from southern Africa reported from the Canary Islands as *Riccia capensis* Steph. by Arnell (1961) and Eggers (1982) but rejected by Perold (1989a).

Riccia limbata Bisch. ex C.Krauss is another taxon from southern Africa reported from the Canary Islands by Arnell (1961) and Eggers (1982) but this is rejected by Perold (1989b) as *Riccia nigrella*.

Riccia oerstediana Lindenb. & Hampe is an American taxon that Schuster (1992b as *Riccia stenophylla* Spruce) assumed was the taxon reported as fertile *Riccia fluitans* from Europe. However, this has never been verified.

Riella parisii Gottsche is reported twice from Europe, Andalucia in Spain (Müller 1953) and in SE France (Skrzypczak 2001). The Spanish report was rejected by Brugués et al. (2011) and the French report by Hugonnot (2019). It is now known only from Algeria and Tunisia.

Sphaerocarpos texanus Austin is reported as widely distributed in Europe but it is shown by Bell et al. (2013) tht the European populations are genetically very distinct from the American populatiopns, although the morphological differences are small. *Sphaerocarpos europaeus* should be used for the European species.

Telaranea nematodes (Gottsche ex Austin) M.Howe is a neotropical-tropical African species which in the past has been reported from several places in southwestern Europe and Macaronesia but Engel and Smith Merrill (2004) showed that the European and Macaronesian populations represent a different taxon, *Telaranea europaea.*

Telaranea sejuncta (Ångstr.) S.W.Arnell is an American species that has been treated as a synonym of *Telaranea nematodes* and reported from Europe under this name. Those reports represents *Telaranea europaea.*

Mosses

Amphidium tortuosum (Hornsch.) Cufod. is a widespread species in the tropics. The Macaronesian endemic *Amphidium curvipes* was synonymised with *Amphidium tortuosum* by Frahm et al. (2000), but Sim-Sim et al. (2017) showed that *Amphidium curvipes* is indeed distinct.

Barbula indica (Hook.) Spreng. is a widespread tropical species, which has been transferred to *Hydrogonium*, as *H. orientale* (F.Weber) Kučera, by Kučera et al. (2013). All European records of '*B. indica*' refer to *H. consanguineum* var. *kurilense* (Kučera et al. 2013).

Bartramia stricta Brid. is considered by Damayanti et al. (2012) to be restricted to South America. See footnote on *Bartramia aprica* above.

Brachymenium commutatum (Müll.Hal.) A.Jaeger is excluded following a revision of the specimens from Europe by Ros et al. (2007).

Brachytheciastrum fendleri (Sull.) Ochyra & Żarnowiec is a North American species; all European records of *B. fendleri* refer to *B. collinum* (Orgaz et al. 2013).

Brotherella henonii (Duby) M.Fleisch. is an east Asian species; molecular studies are needed to support the proposed synonymy of *Brotherella lorentziana* (Frahm 2013) with this species.

Bryum philonotula Müll.Hal. is a synonym of *Pohlia philonotula* (Müll.Hal.) Broth., a little-known African species, and not to be confused with *Bryum philonotulum* Hampe, listed here as a synonym of *Bryum kikuyense*.

Cinclidotus pachylomoides Bizot is a mainly Asian species; European records have not been confirmed and it is considered very doubtful that this species occurs in Europe.

Drepanocladus longifolius (Mitt.) Paris is an exclusively Southern Hemisphere species; Saługa et al. (2018) showed that European records of this species should be referred to *Drepanocladus capillifolius*.

Lindbergia brachyptera (Mitt.) Kindb. occurs only in North America (Ignatova et al. 2010).

Sanionia georgicouncinata (Müll.Hal.) Ochyra & Hedenäs is a Southern Hemisphere species distinct from *S. nivalis* (Hedenäs 2012).

Sphagnum lescurii Sull. is a North American species that has been reported from Europe in the past (e.g. by Corley et al. 1981). European records refer to *Sphagnum auriculatum* and *Sphagnum inundatum*.

Sphagnum magellanicum Brid. has been shown to be confined to southern South America (Hassel et al. 2018).

Tortella arctica (Arnell) Crundw. & Nyholm has not been reliably reported from Europe; see note on *T.* x *cuspidatissima* above.

Taxa only occurring in areas adjacent to the covered area

The following taxa have not yet been found in Europe or northern Macaronesia, but occur just outside the area (in Cape Verde, North Africa, Turkey, Georgia, Azerbadjan, Armenia or western Siberia). Information for liverworts has been obtained from the

ELPT database (Söderström et al. 2019) and for mosses mainly from Ignatov et al. (2006), Kürschner and Erdağ (2005), O'Shea (2006 with updates) and Ros et al. (2013). Some of these taxa are obscure and known only from the original collections; others are mainly American or Pacific species which need to be confirmed in the territories listed.

Liverworts

Acrolejeunea emergens (Mitt.) Steph. (Cape Verde)
Cheilolejeunea xanthocarpa (Lehm. & Lindenb.) Malombe (Cape Verde)
Cyathodium cavernarum Kunze (Cape Verde)
Frullania socotrana Mitt. (Cape Verde)
Frullania spongiosa Steph. (Cape Verde)
Lejeunea capensis Gottsche (Cape Verde)
Lophozia lacerata N.Kitag. (Georgia)
Lophoziopsis excisa var. *infuscata* (R.M.Schust. & Damsh.) Konstant. & Vilnet (Yamal-Nenets)
Lophoziopsis excisa var. *succulenta* (R.M.Schust. & Damsh.) Konstant. & Vilnet (Yamal-Nenets)
Marchantia debilis K.I.Goebel (Morocco, Egypt)
Marchantia pappeana Lehm. subsp. pappeana (Cape Verde)
Plagiochasma eximium (Schiffn.) Steph. (Cape Verde)
Plagiochasma microcephalum (Steph.) Steph. var. *tunesicum* Bischl. (Tunisia)
Pleurozia gigantea (F.Weber) Lindb. (Cape Verde)
Prasanthus jamalicus Potemkin (Yamal-Nenets)
Radula prolifera Arnell (Yamal-Nenets)
Riccia chudoana Steph. (Algeria)
Riccia congoana Steph. (Egypt)
Riccia mamillata Trab. ex Steph. (Algeria)
Riccia polycarpa (Trab.) Jelenc (Algeria)
Riella cyrenaica Maire (Libya)
Riella numidica Trab. (Morocco, Algeria, Libya)
Riella parisii Gottsche (Algeria, Tunisia)
Riella sersuensis Trab. (Algeria)
Scapania brevicaulis Taylor (western Siberia)
Scapania cuspiduligera var. *diplophyllopsis* R.M.Schust. (Yamal-Nenets)
Scapania microdonta (Mitt.) Müll.Frib. (Sverdlovsk)
Solenostoma lignicola (Schiffn.) Váňa, Hentschel & Heinrichs (Turkey)
Solenostoma subtilissimum (Schiffn.) R.M.Schust. (Turkey)
Syzygiella manca (Mont.) Steph. (Cape Verde)

Mosses

Acaulon longifolium Herrnst. & Heyn (Israel)
Aulacomnium acuminatum (Lindb. & Arnell) Kindb. (Arctic Western Siberia)
Barbula arcuata Griff (Egypt)
Brachymenium acuminatum Harv. in Hook. (Cape Verde)
Brachymenium commutatum (Müll.Hal.) A.Jaeger (Algeria, Tunisia)
Brachymenium exile (Dozy & Molk.) Bosch. & Sande Lac. (Algeria, Cape Verde, Lebanon)
Brachytheciastrum bellicum (W.R.Buck, J.A.Jiménez, Ros & M.J.Cano) Vanderp. et al. (Morocco)
Brachythecium umbilicatum Jur. & Milde (Turkey)
Bryum anomodon Mont. (Cape Verde)

Version Today

Bryum atrovirens Brid. (Turkey)
Calohypnum plumiforme (Wilson) Jan Kučera & Ignatov (Georgia)
Cinclidotus bistratosus Kürschner & Lübenau-Nestle (Turkey)
Cinclidotus pachyloma E.S.Salmon (Israel, Lebanon, Turkey)
Cinclidotus vardaranus Erdağ & Kürschner (Turkey)
Crumia latifolia (Kindb.) W.B.Schofield (Armenia)
Didymodon caboverdeanus J.A.Jiménez & M.J.Cano (Cape Verde)
Didymodon tectorum (Müll.Hal.) K.Saito (Egypt)
Entodon pseudoseductrix (Müll.Hal.) A.Jaeger (Cape Verde)
Entodontopsis leucostega (Brid.) W.R.Buck & Ireland (Cape Verde)
Entosthodon angustifolius Jur. & Milde (Jordan, Libya, Turkey)
Entosthodon niloticus Schimp. (Egypt)
Epipterygium rigidum Lindb. ex Broth. (Georgia)
Erpodium grossirete Müll.Hal. (Cape Verde)
Erpodium perrottetii (Mont.) A.Jaeger & Sauerb. (Cape Verde)
Fabronia gueinzii Hampe (Morocco)
Fabronia leikipiae Müll.Hal. (Cape Verde)
Fissidens allorgei P.de la Varde (Cape Verde)
Fissidens androgynus Bruch ex C.Krauss (Cape Verde)
Fissidens dankelmannii Müll.Hal. (Cape Verde)
Fissidens flaccidus Mitt. (Cape Verde)
Fissidens megalotis Schimp. ex Müll.Hal. subsp. *helictocaulos* (Müll.Hal.) Brugg.-Nann. (Cape Verde)
Fissidens sciophyllus Mitt.(Cape Verde)
Fissidens usambaricus Broth. (Cape Verde)
Fontinalis antipyretica Hedw. var. *heldreichii* (Müll.Hal.) Ruthe (Turkey)
Funaria altissima Dixon (Algeria)
Funaria chevalieri P.de la Varde (Cape Verde)
Groutiella tomentosa (Hornsch.) Wijk & Marg. (Cape Verde)
Gymnostomiella erosula (Müll.Hal. ex Dusén) Arts (Cape Verde)
Gymnostomiella vernicosa (Hook. ex Harv.) M.Fleisch. (Cape Verde)
Herpetineuron toccoae (Sull. & Lesq.) Cardot (Cape Verde)
Hookeria acutifolia Hook. & Grev. (Georgia)
Hydrogonium orientale (F.Weber) Jan Kučera (Cape Verde, Egypt)
Hymenostylium congoanum Dixon & Naveau (Cape Verde)
Hymenostylium hildebrandtii (Müll.Hal.) R.H.Zander (Morocco)
Leptodictyum kurdicum (Schiffn.) Broth. (Turkey)
Leucodon bowringii Mitt. (Turkey)
Leucodon coreensis Cardot (Turkey)
Molendoa seravschanica Broth. & Györffy (Arctic Western Siberia)
Orthotrichum urnaceum Müll.Hal. (Armenia, Azerbaijan)
Palamocladium leskeoides (Hook.) E.Britton (Cape Verde)
Perssonia sanguinea Bizot (Cape Verde)
Philonotis laxitexta J.Fröhl. (Lebanon)
Philonotis nanothecioidea Paris & Broth. (Cape Verde)
Physcomitrium immersum Sull. (Egypt)
Physcomitrium niloticum (Delile) Müll.Hal. (Egypt)
Platygyrella densa (Hook.) W.R.Buck (Cape Verde)
Plaubiella sprengelii (Magill) R.H.Zander (Egypt)
Pohlia alba Lindb. & Arnell (Western Siberia)

Pseudoleskeopsis bollei (Broth. & Geh.) P.Rao Cape Verde)
Pseudoleskeopsis pseudoattenuata (Müll.Hal.) Thér. (Cape Verde)
Rhizomnium striatulum (Mitt.) T.J.Kop. (Turkey)
Schistidium cinclidodonteum (Müll.Hal.) B.Bremer (Morocco)
Sphagnum lescurii Sull. & Lesq. (Turkey, if correct; this is a North American species)
Sphagnum perfoliatum L.I.Savicz (Western Siberia and Arctic Western Siberia)
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Syntrichia caninervis Mitt. var. *pseudodesertorum* (Vondr.) M.T.Gallego (Turkey)
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Tortula acaulon var. *galilaea* (Herrnst. & Heyn) Ros & Herrnst. (Israel)
Tortula grandiretis Broth. (Turkey)
Tortula kneuckeri Broth. & Geh. (Egypt)
Tortula plinthobia (Sull. & Lesq.) Broth. (Egypt)
Weissia breutelii Müll.Hal. (Israel, Turkey)
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Weissia ovatifolia Kürschner (Jordan)
Weissia sinaloensis E.B.Bartram (Egypt)

Index

This index enumerates all names mentioned in the text, accepted taxa as well as synonyms. Taxa in bold are accepted taxa occurring in Europe or northern Macaronesia and taxa in square brackets are taxa only occurring outside the area.

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B. bolleana = Hydrogonium bolleanum
B. consanguinea = Hydrogonium consanguineum
B. convoluta = Streblotrichum convolutum
var. *sardoa = Streblotrichum convolutum* var. *commutatum*
B. crocea = Hydrogonium croceum
B. enderesii = Streblotrichum enderesii
[*B. indica*]
B. unguiculata
Bartramia
B. section *Bartramia*
B. halleriana
B. pomiformis
B. section *Pyridium*
B. breviseta
B. ithyphylla
B. subulata
B. section *Strictidium*
B. aprica
B. rosamrosiae = Bartramia aprica
[*B. stricta*]
B. stricta auct. eur.= *Bartramia aprica*
B. laevisphaera
BARTRAMIACEAE
BARTRAMIALES
Bartramioideae
Bazzania
B. azorica
[*B. denudata*]
B. flaccida
B. pearsonii
B. tricrenata

[var. *fulfordiae*]
var. ***tricrenata***
B. trilobata
var. ***depauperata***
var. ***trilobata***
Bazzanioideae
Biantheridion
B. undulifolium
Blasia
B. pusilla
BLASIACEAE
Blepharostoma
[*B. arachnoideum*]
B. trichophyllum
subsp. ***brevirete***
subsp. ***trichophyllum***
var. *brevirete = Blepharostoma trichophyllum* subsp. *brevirete*
BLEPHAROSTOMATACEAE
Blindia
B. acuta
B. caespiticia
Blindiadelphus
B. campylopodus
B. diversifolius
B. polaris
B. recurvatus
B. subimmersus
Brachiolejeuneeae (trib.)
Brachiolejeuneinae (subtrib.)
Brachydontium
B. trichodes
Brachymenium
[*B. commutatum*]
B. notarisii = Anomobryum notarisii
B. paradoxum
B. philonotulum = Bryum kikuyense
BRACHYTHECIACEAE
Brachytheciastrum
B. collinum
B. dieckei
[*B. fendleri*]
B. fendleri auct. eur. = *Brachytheciastrum collinum*
B. olympicum
B. salicinum
B. trachypodium
B. velutinum
var. *vagans = Brachytheciastrum velutinum*
var. *salicinum = Brachytheciastrum salinum*
B.vanekii = Brachytheciastrum velutinum
Brachythecioideae
Brachythecium
B. albicans
B. buchananii
B. campestre
B. capillaceum
B. cirrosum
B. coruscum = Brachythecium tauriscorum
B. erythrorrhizon
subsp. *asiaticum = Brachythecium erythrorrhizon*
var. *thedenii = Brachythecium erythrorrhizon*
B. funkii
B. geheebii
B. glareosum
B. japygum
B. laetum
B. mildeanum
var. *udum = Brachythecium udum*
B. novae-angliae
B. percurrens = Hedenasiastrum percurrens
B. rotaeanum = Brachythecium capillaceum
B. rivulare
B. rutabulum
var. ***atlanticum***
var. ***rutabulum***
B. salebrosum
B. scabridum = Brachythecium novae-angliae
B. tauriscorum
B. tenuicaule
B. tommasinii
B. turgidum
B. udum
Braunia
B. alopecura
B. imberbis
Breidleria = Stereodon
B. pratensis = Stereodon pratensis

Breutelia
B. azorica
B. chrysocoma
Breutelioideae
Brotherella
[*B. henonii*]
B. henonii auct. eur. = *Brotherella lorentziana*
B. lorentziana
Bruchia
B. flexuosa
B. vogesiaca
BRUCHIACEAE
Bryhnia = Brachythecium
B. novae-angliae = Brachythecium novae-angliae
B. scabrida = Brachythecium novae-angliae
BRYALES
BRYACEAE
Bryoerythrophyllum
B. alpigenum
B. caledonicum
B. campylocarpum
B. duellii
B. ferruginascens
B. inaequalifolium
B. recurvirostrum
B. rubrum
Bryobrittonia
B. longipes
BRYOXIPHIACEAE
BRYOXIPHIALES
Bryoxiphium
B. madeirense
B. norvegicum
Bryum
B. algovicum = Ptychostomum compactum
B. algovicum var. *rutheanum = Ptychostomum algovicum* var. *rutheanum*
B. alpinum = Imbribryum alpinum
B. apiculatum = Anomobryum apiculatum
B. archangelicum = Ptychostomum inclinatum
B. arcticum = Ptychostomum arcticum
B. argenteum
B. austriacum = Ptychostomum austriacum
B. bavaricum
B. blindii
B. bornholmense = Ptychostomum bornholmense
B. caespiticium = Ptychostomum imbricatulum
B. calophyllum = Ptychostomum calophyllum
B. canariense
B. capillare = Ptychostomum capillare
B. caucasicum
B. cellulare = Ptychostomum cellulare
B. creberrimum = Ptychostomum creberrimum
B. cryophilum = Ptychostomum cryophilum
B. cyclophyllum = Ptychostomum cyclophyllum
B. demaretianum
B. dichotomum
B. dixonii
B. donianum = Ptychostomum donianum
B. dyffrynense
B. elegans = Ptychostomum elegans
B. funkii = Ptychostomum funkii
B. gemmiferum
B. gemmilucens
B. gemmiparum
B. inclinatum = Distichium inclinatum
B. intermedium = Ptychostomum intermedium
B. kikuyense
B. klinggraeffii
B. knowltonii = Ptychostomum knowltonii
B. kunzei = Ptychostomum kunzei
B. longisetum = Ptychostomum longisetum
B. marratii
B. mildeanum = Imbribryum mildeanum
B. miniatum = Imbribryum miniatum
B. minii = Ptychostomum minii

B. moravicum = Ptychostomum moravicum
B. muehlenbeckii = Imbribryum muehlenbeckii
B. neodamense = Ptychostomum pseudotriquetrum
B. oblongum
B. pallens = Ptychostomum pallens
fo. *gracile = Ptychostomum pallens*
[subsp. *acutiusculum = Ptychostomum pallens*]
subsp. *prosboreum = Ptychostomum pallens*
subsp. *sibiricum = Ptychostomum pallens*
B. pallescens = Ptychostomum pallescens
[*Bryum philonotulum*]
B. philonotulum auct. eur. *= Bryum kikuyense*
B. pseudotriquetrum = Ptychostomum pseudotriquetrum
var. *bimum* **=** *Ptychostomum pseudotriquetrum* var. *bimum*
B. radiculosum
B. reyeri
B. riparium
B. rubens = Ptychostomum rubens
B. ruderale
B. salinum = Ptychostomum salinum
B. sauteri
B. schleicheri = Ptychostomum schleicheri
var. *latifolium = Ptychostomum schleicheri* var. *latifolium*
var. *schleicheri = Ptychostomum schleicheri* var. *schleicheri*
B. sibiricum = Ptychostomum pallens
B. subapiculatum = Imbribryum subapiculatum
B. tenuisetum = Imbribryum tenuisetum
B. torquescens = Ptychostomum torquescens
B. turbinatum = Ptychostomum turbinatum
B. uliginosum = Ptychostomum cernuum
B. valparaisense
B. versicolor
B. violaceum
B. warneum = Ptychostomum warneum
B. weigelii = Ptychostomum weigelii
B. wrightii = Ptychostomum wrightii
Bucegia = Marchantia subgenus *Preissia*
B. romanica = Marchantia romanica
Buckia
B. vaucheri
Buckiella = Plagiothecium
B. undulata = Plagiothecium undulatum
Bucklandiella = Racomitrium subgenus *Ellipticodryptodon*
B. affinis = Racomitrium affine
B. elliptica = Racomitrium ellipticum
B. heterosticha = Racomitrium heterostichum
B. himalayana = Racomitrium himalayanum
B. lamprocarpa = Racomitrium lamprocarpum
B. lusitanica = Racomitrium lusitanicum
B. macounii = Racomitrium macounii
subsp. *alpina = Racomitrium macounii* subsp. *alpinum*
B. microcarpa = Racomitrium microcarpon
B. nivalis = Racomitrium nivale
B. obtusa = Racomitrium obtusum
B. sudetica = Racomitrium sudeticum
Buxbaumia
B. aphylla
B. viridis
BUXBAUMIACEAE
BUXBAUMIALES
CALLICLADIACEAE
Callicladium
C. haldanianum
C. imponens
CALLIERGONACEAE

Calliergonella
- ***C. cuspidata***
- ***C. lindbergii***

Calliergon
- ***C. cordifolium***
- ***C. giganteum***
- ***C. megalophyllum***
- ***C. richardsonii***

Calomnion
- ***C. complanatum***

Calycularia
- ***C. laxa***

CALYCULARIACEAE

CALYMPERACEAE

Calymperes
- ***C. erosum***

Calypogeia
- *C.* subgenus *Asperifoliae*
- *C.* subgenus *Calypogeia*
- ***C. arguta***
- ***C. azorica***
- ***C. azurea***
- ***C. fissa***
  - subsp. ***fissa***
  - subsp. **neogaea**
  - var. ***paludosa***
- ***C. integristipula***
- ***C. muelleriana***
  - [subsp. *blomquistii*]
  - var. *erecta* = *Calypogeia muelleriana* subsp. *muelleriana*
  - subsp. ***muelleriana***
- ***C. neesiana***
  - var. *erecta* = *Calypogeia neesiana* var. *erecta*
  - subsp. ***neesiana***
  - var. *repanda* = *Calypogeia neesiana* subsp. *neesiana*
  - [subsp. *subalpina*]
- ***C. sphagnicola***
- ***C. suecica***

CALYPOGEIACEAE

Calyptrochaeta
- ***C. apiculata***

Campyliadelphus
- ***C. chrysophyllus***
- ***C. elodes***

Campylidium = *Campylophyllopsis*
- *C. calcareum* = *Campylophyllopsis calcarea*
- *C. sommerfeltii* = *Campylophyllopsis sommerfeldtii*

Campylium
- ***C. bambergeri***
- ***C. laxifolium***
- ***C. longicuspis***
- ***C. protensum***
- ***C. stellatum***

Campylophyllopsis
- ***C. calcarea***
- ***C. sommerfeltii***

Campylophyllum
- *C. calcareum* = *Campylophyllopsis calcarea*
- ***C. halleri***
- ***C. montanum***
- *C. sommerfeltii* = *Campylophyllopsis sommerfeltii*

Campylopus
- ***C. atrovirens***
  - var. *falcatus* = *Campylopus atrovirens*
- ***C. brevipilus***
- ***C. cygneus***
- ***C. flaccidus***
- ***C. flexuosus***
- ***C. fragilis***
- ***C. gracilis***
- ***C. incrassatus***
- ***C. introflexus***
- ***C. oerstedianus***
- ***C. pilifer***
- ***C. pyriformis***
  - var. *azoricus* = *Campylopus pyriformis*
- ***C. schimperi***
- *C. schwarzii* = *Campylopus gracilis*
- ***C. setifolius***
- ***C. shawii***
- ***C. subulatus***
  - var. *schimperi* = *Campylopus schimperi*
- *C. subporodictyon* = *Atractylocarpus subporodictyon*

Campylostelium
- ***C. pitardii***
- ***C. saxicola***
- ***C. strictum***

CATOSCOPIACEAE
CATOSCOPIALES
Catoscopium
C. nigritum
DISCELIACEAE
Cephalozia
C. affinis = Fuscocephaloziopsis affinis
C. ambigua
C. bicuspidata
subsp. ***bicuspidata***
subsp. ***lammersiana***
var. *paludosa = Cephalozia ambigua*
C. catenulata = Fuscocephaloziopsis catenulata
C. connivens = Fuscocephaloziopsis connivens
var. *compacta = Fuscocephaloziopsis connivens* subsp. *connivens*
C. crassifolia = Fuscocephaloziopsis crassifolia
C. crossii
C. lacinulata
C. leucantha = Fuscocephaloziopsis leucantha
var. *robusta = Fuscocephaloziopsis leucantha*
C. loitlesbergeri = Fuscocephaloziopsis loitlesbergeri
[*Cephalozia lucens*]
C. lunulifolia = Fuscocephaloziopsis lunulifolia
C. macounii
C. macrostachya = Fuscocephaloziopsis macrostachya
C. pleniceps = Fuscocephaloziopsis pleniceps
var. *sphagnorum = Fuscocephaloziopsis pleniceps* var. *pleniceps*
CEPHALOZIACEAE
Cephaloziella
C. subgenus Cephaloziella
C. subgenus *Dichiton*
C. subgenus *Evansia*
C. subgenus *Prionolobus*
C. alpina = Cephaloziella varians
C. arctica = Cephaloziella varians
C. arctogena
C. aspericaulis
C. baumgartneri
C. calyculata
C. dentata
C. divaricata
var. *asperifolia = Cephaloziella divaricata* var. *scabra*]
var. ***divaricata***
var. *rupestris = Cephaloziella divaricata* var. *divaricata*
var. ***scabra***
C. elachista
var. ***elachista***
[var. *spinophylla*]
C. elegans
C. granatensis
C. grimsulana
C. hampeana
var. *subtilis = Cephaloziella hampeana*
C. integerrima
var. *obtusa = Cephaloziella integerrima*
[*C. mammillifera*]
C. massalongi
var. *compacta = Cephaloziella massalongi*
C. nicholsonii
C. phyllacantha
C. polystratosa
C. rubella
subsp. *arctogena = Cephaloziella arctogena*
var. *bifida = Cephaloziella rubella*
var. *elegans = Cephaloziella elegans*
var. *pulchella = Cephaloziella rubella*
var. *sullivantii = Cephaloziella rubella*
C. spinigera
f. *striatula = Cephaloziella spinigera*

C. stellulifera
var. *limprichtii* = *Cephaloziella stellulifera*
C. subdentata = *Cephaloziella spinigera*
C. turneri
C. *uncinata*
[var. *brevigyna*]
[var. *sphagnicola*]
var. ***uncinata***
C. varians
var. *arctica* = *Cephaloziella varians*
var. *scabra* = *Cephaloziella varians*
[*C. verrucosa*]
CEPHALOZIELLACEAE
Cephalozioideae
Ceratodon
C. amazonum
C. conicus
C. purpureus
subsp. ***purpureus***
subsp. ***stenocarpus***
var. *conicus* = *Ceratodon conicus*
Cheilolejeunea
C. subgenus *Euosmolejeunea*
C. cedercreutzii
[*C. xanthocarpa*]
Cheilolejeuneinae (subtrib.)
Cheilothela
C. chloropus
Chenia
C. leptophylla
C. ruigtevleia
Chiloscyphus
C. coadunatus = *Lophocolea coadunata*
C. fragrans = *Lophocolea fragrans*
C. latifolius = *Lophocolea bidentata*
C. minor = *Lophocolea minor*
C. pallescens
var. ***fragilis***
var. ***pallescens***
C. polyanthos
var. ***polyanthos***
var. ***rivularis***
C. profundus = *Lophocolea heterophylla*
Chionoloma
C. bombayense
C. daldinianum
C. hibernicum
C. minus
C. recurvifolium
C. tenuirostre
var. ***holtii***
var. ***tenuirostre***
Cinclidium
C. arcticum
C. latifolium
C. minutifolium
C. stygium
C. subrotundum
Cinclidotus
C. confertus = *Cinclidotus riparius*
C. aquaticus
C. danubicus
C. fontinaloides
[*C. pachylomoides*]
C. riparius
C. vivesii
Cirriphyllum
C. crassinervium
C. piliferum
Cladopodiella = *Odontoschisma*
C. francisci = *Odontoschisma francisci*
C. fluitans = *Odontoschisma fluitans*
Claopodium
C. rostratum
C. whippleanum
Clasmatodon
C. parvulus
Cleistocarpidium
C. palustre
Clevea
C. hyalina
var. *rufescens* = *Clevea hyalina*
var. *suecica* = *Clevea hyalina*
C. spathysii
CLEVEACEAE
CLIMACIACEAE
Climacium
C. dendroides
Cnestrum
C. alpestre
C. glaucescens
C. schisti
Codonoblepharon

C. forsteri
Codriophorus = *Racomitrium* subgenus *Cataracta*
C. acicularis = *Racomitrium acicularis*
C. aquaticus = *Racomitrium aquaticus*
C. fascicularis = *Racomitrium fasciculare*
C. hespericus = *Racomitrium hespericum*
Cololejeunea
C. subgenus *Aphanolejeunea*
C. subgenus *Cololejeunea*
C. subgenus *Diaphanae*
C. azorica
C. calcarea
C. madeirensis
C. microscopica
[var. *africana*]
[var. *exigua*]
var. ***microscopica***
C. minutissima = *Myriocoleopsis minutissima*
C. rossettiana
C. schaeferi
C. sintenisii
Cololejeuneinae (subtrib.)
Colura
C. subgenus *Colura*
C. section *Colura*
C. calyptrifolia
Conardia
C. compacta
CONOCEPHALACEAE
Conocephalum
C. conicum
C. salebrosum
Conostomoideae
Conostomum
C. tetragonum
Corsinia
C. coriandrina
CORSINIACEAE
Corsinioideae
Coscinodon
C. cribrosus
C. horridus
C. humilis
C. monchiquensis
Cratoneuroideae
Cratoneuron
C. curvicaule
C. filicinum
Crossidium
C. aberrans
C. crassinervium
C. davidai
C. geheebii
C. laevipilum
C. laxefilamentosum
C. squamiferum
var. ***pottioideum***
var. ***squamiferum***
Crossogyna = *Syzygiella*
S. autumnalis = *Syzygiella autumnalis*
Crossocalyx
C. hellerianus
Cryphaea
C. heteromalla
CRYPHAEACEAE
Cryptoleptodon = *Leptodon*
C. longisetus = *Leptodon longisetus*
Cryptocolea
C. imbricata
Cryptothallus = *Aneura*
C. mirabilis = *Aneura mirabilis*
Ctenidium
C. molluscum
C. procerrimum = *Pseudostereodon procerrimus*
CYATHODIACEAE
Cyathodium
[*C. cavernarum*]
C. foetidissimum
[*C. spurium*]
Cyclodictyon
C. laetevirens
Cynodontium
C. asperifolium
C. bruntonii
C. fallax
C. gracilescens
C. jenneri
C. polycarpon
C. strumiferum
C. suecicum
C. tenellum
Cyrtomnium

C. hymenophylloides
C. hymenophyllum
Daltonia
D. splachnoides
D. stenophylla
DALTONIACEAE
Delavayelloideae
Dendrocryphaea
D. lamyana
Desmatodon = Tortula
D. bogosicus = Tortula bogosica
D. guepinii = Tortula guepinii
D. latifolius = Tortula hoppeana
D. laureri = Tortula laureri
D. leucostoma = Tortula leucostoma
D. meridionalis = Tortula marginata
D. randii = Tortula randii
D. systylius = Tortula systylia
D. ucrainicus = Tortula ucrainica
D. wilczekii = Hennediella heimii
Dichelyma
D. capillaceum
D. falcatum
Dialytrichia
D. fragilifolia = Dialytrichia saxicola
D. mucronata
D. saxicola
Dichiton = Cephaloziella
D. integerrimum = Cephaloziella integerrima
Dichodontium
D. flavescens
D. palustre = Diobelonella palustris
D. pellucidum
DICRANALES
DICRANACEAE SCHIMP.
Dicranella
D. campylophylla
D. cerviculata
D. crispa
D. grevilleana
D. heteromalla
D. howei
D. humilis
D. palustris = Diobelonella palustris
D. riparia = Kiaeria riparia
D. rufescens
D. schreberiana
D. staphylina
D. subulata
D. varia
DICRANELLACEAE
Dicranoideae Lindb.
Dicranodontium
D. asperulum
D. denudatum
var. *alpinum = Dicranodontium denudatum*
D. subporodictyon = Atractylocarpus subporodictyon
D. uncinatum
Dicranoloma
D. menziesii
Dicranoweisia
D. cirrata
D. compacta = Hymenoloma compactum
D. crispula = Hymenoloma crispulum
var. *compacta = Hymenoloma compactum*
var. *intermedia = Hymenoloma mulahaceni*
D. intermedia = Hymenoloma mulahaceni
Dicranum
D. section *Convolutifolia*
D. section *Crassinervia*
D. section *Dicranum*
D. section *Elongata*
D. section *Fuscescentiformia*
D. section *Montana*
D. section *Spuria*
D. acutifolium
D. angustum
D. bardunovii
D. bergeri = Dicranum undulatum
var. *acutifolium = Dicranum acutifolium*
D. bonjeanii
D. brevifolium
D. canariense = Dicranum scottianum
D. congestum = Dicranum flexicaule
D. crassifolium
D. dispersum
D. drummondii
D. elongatum
D. flagellare
D. fragilifolium
D. flexicaule

D. fulvum
D. fuscescens
var. *congestum* = *Dicranum flexicaule*
var. *flexicaule* = *Dicranum flexicaule*
D. groenlandicum
D. laevidens
D. leioneuron
D. majus
D. montanum
D. muehlenbeckii
var. *acutifolium* = *Dicranum acutifolium*
var. *brevifolium* = *Dicranum brevifolium*
var. *cirrhatum* = *Dicranum brevifolium*
D. polysetum
D. rugosum = *Dicranum polysetum*
D. schljakovii
D. scoparium
D. scottianum
D. septentrionale
D. spadiceum
D. spurium
D. strictum = *Dicranum tauricum*
D. subporodictyon = *Atractylocarpus subporodictyon*
D. tauricum
D. transsylvanicum
D. undulatum
D. undulatum F.Weber & D.Mohr, hom. illeg. = *Dicranum polysetum*
D. undulatum Turner, hom. illeg. = *Dicranum bonjeanii*
D. viride
Didymodon
D. acutus
D. asperifolius
D. australasiae
D. bistratosus
D. brachyphyllus
D. cordatus
D. cylindricus = *Trichodon cylindricus*
var. *daldinianus* = *Chionoloma daldinianus*
D. eckeliae
D. erosus = *Didymodon tophaceus* subsp. *erosus*
D. fallax
D. ferrugineus
D. giganteus
D. glaucus
subsp. ***glaucus***
subsp. ***verbanus***
D. icmadophilus
D. insulanus
D. johansenii
D. lamyanus = *Didymodon brachyphyllus*
D. luridus
D. maschalogenus
D. maximus
D. nicholsonii
D. rigidulus
D. sicculus = *Didymodon tophaceus* subsp. *sicculus*
D. sinuosus
D. spadiceus
D. subandreaeoides
D. tomaculosus
D. tophaceus
subsp. ***erosus***
subsp. ***sicculus***
subsp. ***tophaceus***
var. ***anatinus***
D. umbrosus
D. validus
D. verbanus = *Didymodon glaucus* subsp. *verbanus*
D. vinealis
Dilutineuron = *Racomitrium* subgenus *Cataracta*
D. fasciculare = *Racomitrium fasciculare*
Diobelonella
D. palustris
DIPHYSCIACEAE
DIPHYSCIALES
Diphyscium
D. foliosum
Diplophyllum
D. section Diplophyllum
D. section *Protodiplophyllum*
D. albicans
D. obtusatum
D. obtusifolium

[subsp. domesticum]
subsp. ***obtusifolium***
[***D. sibiricum***]
D. taxifolium
var. *macrosticta = Diplophyllum taxifolium*
[var. *mucronatum*]
var. ***taxifolium***
Discelium
D. nudum
DISTICHIACEAE
Distichium
D. capillaceum
D. hagenii
D. inclinatum
Distichophyllum
D. carinatum
DITRICHACEAE
Ditrichum
D. cornubicum
D. crispatissimum = Flexitrichum gracile
D. cylindricum = Trichodon cylindricus
D. flexicaule = Flexitrichum flexicaule
D. gracile = Flexitrichum gracile
D. heteromallum
D. lineare
D. pallidum
D. plumbicola
D. punctulatum
D. pusillum
D. subulatum
D. zonatum
var. *scabrifolium = Ditrichum zonatum*
Douinia
D. ovata
Drepanium
D. fastigiatum
D. recurvatum = Drepanium fastigiatum
Drepanocladus
D. aduncus
D. angustifolius
D. arcticus
D. brevifolius
D. capillifolius
[*D. longifolius*]
D. longifolius auct. eur. = *Drepanocladus capillifolius*
D. lycopodioides
D. polygamus
D. sendtneri
D. sordidus
D. trifarius
D. turgescens
Drepanolejeunea
D. subgenus *Drepanolejeunea*
D. hamatifolia
Drepanolejeuneinae (subtrib.)
Dryptodon = Grimmia
D. orbicularis = Grimmia orbicularis
D. patens = Grimmia ramondii
Dumortiera
D. hirsuta
subsp. ***hirsuta***
[subsp. *nepalensis*]
[subsp. *tatunoi*]
DUMORTIERACEAE
ECHINODIACEAE
Echinodium
E. prolixum = Isothecium prolixum
E. renauldii
E. setigerum
E. spinosum
Elodium = Helodium
E. blandowii = Helodium blandowii
Encalypta
E. section *Encalypta*
E. section *Megasporae*
E. section *Pyromitrium*
E. section *Rhabdotheca*
E. section *Streptotheca*
E. affinis
subsp. ***affinis***
subsp. ***macounii***
E. alpina
E. brevicolla
E. brevipes
E. ciliata
E. intermedia = Encalypta pilifera
E. longicolla
E. microstoma
E. mutica
E. obovatifolia = Encalypta pilifera
E. pilifera
E. procera

E. rhaptocarpa
var. *leptodon* = *Encalypta trachymitra*
var. *spathulata* = *Encalypta spathulata*
var. *trachymitria* = *Encalypta trachymitria*
E. spathulata
E. streptocarpa
E. trachymitria
E. vulgaris
ENCALYPTALES
ENCALYPTACEAE
Endogemma
E. caespiticia
ENDOGEMMATACEAE
Entodon
E. challengeri
E. cladorrhizans
E. concinnus
E. schleicheri
ENTODONTACEAE
Entosthodon
E. subgenus *Entosthodon*
E. subgenus *Murcia*
E. subgenus *Plagiodus*
E. abramovae
E. attenuatus
E. commutatus
E. convexus
E. dagestanicus
E. duriaei
E. fascicularis
E. handelii
E. hungaricus
E. kroonkurk
E. mouretii
E. muhlenbergii
E. obtusus
E. pulchellus
E. schimperi
E. stenophyllus
E. tempeltoni = *Entosthodon attenuatus*
Ephemerella = *Ephemerum*
E. readeri = *Physcomitrium readeri*
Ephemerum
E. cohaerens
E. crassinervium
subsp. ***rutheanum***
subsp. ***sessile***
E. hibernicum = *Ephemerum crassinervium* subsp. *rutheanum*
E. minutissimum = *Ephemerum serratum*
E. recurvifolium
E. rutheanum = *Ephemerum crassinervium* subsp. *rutheanum*
E. serratum
var. *minutissimum* = *Ephemerum serratum*
var. *rutheanum* = *Ephemerum crassinervium* subsp. *rutheanum*
E. serratum auct. = *Ephemerum stoloniferum*
E. sessile = *Ephemerum crassinervium* subsp. *sessile*
E. spinulosum
E. stellatum = *Ephemerum stoloniferum*
E. stoloniferum
Epipterygium
E. tozeri
Eremonotus
E. myriocarpus
Eucladium
E. verticillatum
var. *angustifolium* = *Eucladium verticillatum*
Eurhynchiastrum
E. diversifolium
E. pulchellum
var. *praecox* = *Eurhynchiastrum pulchellum*
var. *diversifolium* = *Eurhynchiastrum diversifolium*
Eurhynchioideae
Eurhynchium
E. angustirete
E. striatum
Exobryum
E. asperifolium = *Didymodon asperifolius*
E. johansenii = *Didymodon johansenii*

Exormotheca
E. subgenus *Corbierella*
E. subgenus *Exormotheca*
E. pustulosa
E. welwitschii
EXORMOTHECACEAE
Exsertotheca
E. baetica
E. crispa
E. intermedia
Fabronia
F. altaica
F. ciliaris
F. major
F. pusilla
FABRONIACEAE
[*Fimbraria = Asterella*]
[*F. blumeana = Asterella blumeana*]
[*F. elegans = Asterella elegans*]
[*F. marginata = Asterella marginata*]
[*F. raddii = Asterella wallichiana*]
[*F. stahlii = Asterella pringlei*]
[*Fimbraria tenella = Asterella tenella*]
Fissidens
F. subgenus *Aloma*
F. subgenus *Fissidens*
F. subgenus *Octodiceras*
F. subgenus *Pachyfissidens*
F. section *Amblyothallia*
F. section *Pachyfissidens*
F. adianthoides
F. algarvicus = Fissidens curvatus
F. arcticus
F. arnoldii
F. asplenioides
F. azoricus
F. bambergeri = Fissidens viridulus
F. bryoides
var. ***bryoides***
var. ***caespitans***
var. *curnovii = Fissidens bryoides* var. *caespitans*
F. celticus
F. coacervatus
F. crassipes
subsp. ***crassipes***
subsp. ***warnstorfii***
F. crispus
F. cristatus = Fissidens dubius
F. curnovii = Fissidens bryoides var. *caespitans*
F. curvatus
F. dubius
var. ***dubius***
var. ***mucronatus***
F. exiguus auct. eur. = *Fissidens viridulus*
F. exilis
F. fontanus
F. gracilifolius
F. grandifrons
F. gymnandrus
F. herzogii = Fissidens crispus
F. incurvus
F. jansenii
F. limbatus = Fissidens crispus
F. luisieri = Fissidens serrulatus
F. microstictus
F. minutulus = Fissidens crispus
F. monguillonii
F. nobreganus
F. osmundoides
F. ovatifolius
F. polyphyllus
F. pusillus
F. rivularis
F. rufulus
F. serratus
F. serrulatus
F. sublimbatus
F. sublineaefolius
F. taxifolius
subsp. *pallidicaulis = Fissidens taxifolius*
F. viridulus
var. *incurvus = Fissidens incurvus*
var. *pusillus = Fissidens pusillus*
var. *tenuifolius = Fissidens gracilifolius*
var. ***viridulus***
var. *bambergeri = Fissidens viridulus*
FISSIDENTACEAE
FLEXITRICHACEAE
Flexitrichum
F. flexicaule
F. gracile
FONTINALACEAE
Fontinalis

F. antipyretica
subsp. ***antipyretica***
subsp. ***bryhnii***
subsp. ***gracilis***
subsp. ***kindbergii***
F. dalecarlica
F. dichelymoides
F. hypnoides
var. ***duriaei***
var. ***hypnoides***
F. squamosa
var. *curnowii* = *Fontinalis squamosa*
var. *dixonii* = *Fontinalis squamosa*
Fossombronia
F. angulosa
F. caespitiformis
subsp. ***caespitiformis***
subsp. ***multispira***
F. crispa
F. crozalsii = *Fossombronia mittenii*
F. echinata
F. fimbriata
F. fleischeri
F. foveolata
F. husnotii = *Fossombronia caespitiformis* subsp. *multispira*
F. incurva
F. leucoxantha
F. maritima
F. mittenii
F. pusilla
F. wondraczekii
F. zeyheri
FOSSOMBRONIACEAE
Frullania
F. subgenus *Frullania*
F. section *Frullania*
F. subgenus *Thyopsiella*
F. acicularis
F. azorica
F. bolanderi
F. calcarifera
F. cesatiana = *Frullania riparia*
F. cleistostoma
[*F. davurica*]
subsp. *jackii* = *Frullania jackii*
F. dilatata
[subsp. *asiatica*]
subsp. ***dilatata***
F. ericoides
var. ***ericoides***
[var. *laxa*]
[var. *minor*]
[var. *verrucosa*]
F. inflata auct. = *F. cleistostoma*
[*F. inflata*]
F. fragilifolia
F. jackii
F. microphylla
var. *deciduifolia* = *Frullania microphylla*
[*Frullania muscicola*]
F. oakesiana
subsp. ***oakesiana***
[subsp. *takayuensis*]
[*F. obscurifolia*]
F. parvistipula
F. polysticta
F. riparia
F. sergiae
[*F. socotrana*]
[*F. spongiosa*]
F. subarctica
F. tamarisci
var. *atrovirens* = *Frullania tamarisci*
var. *azorica* = *Frullania acicularis*
var. *cornubica* = *Frullania tamarisci*
var. *ericetorum* = *Frullania tamarisci*
var. *robusta* = *Frullania tamarisci*
var. *sardoa* = *Frullania tamarisci*
F. teneriffae
FRULLANIACEAE
Funaria
[*F. anomala*]
F. dentata = *Entosthodon muhlenbergii*
F. handelii = *Entosthodon handelii*
F. aequidens
F. arctica
F. hygrometrica
F. microstoma
FUNARIACEAE
FUNARIALES
Funariella
F. curviseta

FUNARIOIDEAE
Fuscobryum = Didymodon
F. subandreaeoides = Didymodon subandreaeoides
Fuscocephaloziopsis
F. affinis
F. albescens
var. ***albescens***
var. ***islandica***
F. catenulata
subsp. ***catenulata***
[subsp. *nipponica*]
F. connivens
subsp. ***connivens***
[subsp. *fissa*]
[subsp. *sandwicensis*]
F. crassifolia
F. leucantha
F. loitlesbergeri
F. lunulifolia
F. macrostachya
subsp. ***macrostachya***
var. ***macrostachya***
var. ***spiniflora***
[subsp. *australis*]
F. pleniceps
[var. *caroliniana*]
var. ***pleniceps***
Geheebia = Didymodon
G. fallax = Didymodon fallax
G. ferruginea = Didymodon ferrugineus
G. gigantea = Didymodon giganteus
G. maschalogena = Didymodon maschalogenus
G. maxima = Didymodon maximus
G. spadicea = Didymodon spadiceus
G. tophacea = Didymodon tophaceus
GEOCALYCACEAE
Gemmabryum
G. apiculatum = Anomobryum apiculatum
G. barnesii = Bryum dichotomum
G. caespiticium = Ptychostomum imbricatulum
G. demaretianum = Bryum demaretianum
G. dichotomum = Bryum dichotomum
G. gemmiferum = Bryum gemmiferum
G. gemmilucens = Bryum gemmilucens
G. klinggraeffii = Bryum klinggraeffii
G. kunzei = Ptychostomum kunzei
G. radiculosum = Bryum radiculosum
G. ruderale = Bryum ruderale
G. subapiculatum = Imbribryum subapiculatum
G. tenuisetum = Imbribryum tenuisetum
G. valparaisense = Bryum valparaisense
G. violaceum = Bryum violaceum

Geocalyx
G. graveolens
GIGASPERMACEAE
GIGASPERMALES
Gigaspermum
G. mouretii
Glyphomitrium
G. daviesii
Gongylanthus
G. ericetorum
Goniomitrium
G. seroi
Grimmia
G. alpestris
G. anodon
G. anomala
G. arenaria
G. atrata
G. britannica = Grimmia trichophylla
G. caespiticia
G. capillata
G. cribrosa = Coscinodon cribrosus
G. crinita
G. crinitoleucophaea
G. curvata = Grimmia ramondii
G. curviseta
G. decipiens
G. dissimulata
G. donniana
G. elatior
G. elongata
G. funalis
G. fuscolutea

G. hartmanii
G. horrida = Coscinodon horridus
G. incurva
G. laevigata
G. lisae
G. longirostris
G. meridionalis
G. meteorae = Grimmia nutans
G. mollis
G. montana
G. muehlenbeckii
G. nutans
G. orbicularis
G. ovalis
G. pitardii = Campylostelium pitardii
G. plagiopodia
G. poecilostoma = Grimmia crinitoleucophaea
G. pulvinata
G. ramondii
G. reflexidens
G. sessitana = Grimmia reflexidens
G. teretinervis
G. tergestina
var. *tergestinoides = Grimmia tergestina*
G. torquata
G. trichophylla
var. *meridionalis = Grimmia meridionalis*
G. triformis
G. ungeri
G. unicolor
GRIMMIACEAE
GRIMMIALES
Grimmioideae
Guembelia = Grimmia
G. laevigata = Grimmia laevigata
G. longirostris = Grimmia longirostris
G. ovalis = Grimmia ovalis
G. tergestina = Grimmia tergestina
Gymnobarbula
G. bicolor
Gymnocolea
G. acutiloba = Gymnocolea inflata subsp. *acutiloba*
G. borealis
G. fascinifera
G. inflata
subsp. ***acutiloba***
var. *heterostipa = Gymnocolea inflata* subsp. *inflata*
subsp. ***inflata***
GYMNOMITRIACEAE
Gymnomitrioideae
Gymnomitrion
G. adustum
G. alpinum
G. apiculatum = Marsupella apiculata
G. brevissimum
G. commutatum
G. concinnatum
G. corallioides
G. crenulatum
G. obtusum
G. revolutum
[subsp. *novoguineanense*]
subsp. ***revolutum***
Gymnostomum
G. aeruginosum
var. ***aeruginosum***
var. ***obscurum***
G. boreale = Hymenostylium gracillimum
G. calcareum
var. *lanceolatum = Gymnostomum calcareum*
var. ***atlanticum***
var. ***calcareum***
G. lanceolatum = Gymnostomum calcareum
G. recurvirostrum = Hymenostylium recurvirostrum
G. viridulum
Gyroweisia
G. reflexa
G. tenuis
Habrodon
H. perpusillus
HABRODONTACEAE
Hageniella
H. micans
Hamatocaulis
H. lapponicus
H. vernicosus
Haplocladium
H. angustifolium
H. microphyllum

H. virginianum
Haplohymenium = Anomodon
H. triste = Anomodon tristis
HAPLOMITRIACEAE
Haplomitrium
H. subgenus *Haplomitrium*
H. section *Haplomitrium*
H. hookeri
var. ***hookeri***
[var. *minutum*]
Harpalejeunea
H. subgenus *Harpalejeunea*
H. molleri
[subsp. *integra*]
subsp. ***molleri***
HARPANTHACEAE
Harpanthus
H. flotovianus
var. *chiloscyphoides = Harpanthus flotovianus*
var. *latifolia = Harpanthus flotovianus*
var. *retusa = Harpanthus flotovianus*
H. scutatus
Hedenasiastrum
H. percurrens
Hedwigia
H. ciliata
var. *leucophaea = Hedwigia emodica*
H. emodica
H. integrifolia = Hedwigidium integrifolium
H. mollis
H. nemoralis
H. stellata
H. striata
HEDWIGIACEAE
HEDWIGIALES
Hedwigidium = Braunia
H. integrifolium = Braunia imberbis
Helicodontium
H. capillare
Helicodontoideae
Helodium
H. blandowii
Hennediella
H. heimii
var. ***arctica***
var. ***heimii***
H. macrophylla
H. stanfordensis
HERBERTACEAE
Herbertus
[*Herbertus aduncus*]
subsp. *hutchinsiae = H. hutchinsiae*
H. aduncus auct eur = Herbertus hutchinsiae
H. azoricus
H. borealis
H. delavayi auct. *= Herbertus borealis*
[*H. delavayi*]
[*H. dicranus*]
H. hutchinsiae
H. norenus
H. sendtneri
H. stramineus
Herzogiella
H. seligeri
H. striatella
H. turfacea
Heterocladiella
H. dimorpha
HETEROCLADIELLACEAE
Heterocladium
H. dimorphum = Heterocladiella dimorpha
H. flaccidum
H. heteropterum
H. wulfsbergii
Heterogemma
H. capitata
H. laxa
Heterophyllium
H. affine
Heteroscyphus
H. denticulatus
H. fissistipus
[var. *fissistipus*]
[var. *multispinus*]
[var. *repandus*]
[*H. integrifolius*]
Hilpertia
H. velenovskyi
Homalia
H. lusitanica
H. trichomanoides

H. webbiana = Pseudomalia webbiana
Homalothecium
H. aureum
H. lutescens
var. ***fallax***
var. ***lutescens***
H. mandonii
H. meridionale
H. philippeanum
H. sericeum
Homomallium
H. incurvatum
Hookeria
H. lucens
HOOKERIACEAE
HOOKERIALES
Hydrogonium
H. amplexifolium
H. bolleanum
H. consanguineum
[var. *consanguineum*]
var. ***kurilense***
H. croceum
[*H. orientale*]
Hydrogrimmia = Grimmia
H. mollis = Grimmia mollis
Hygroamblystegium
H. fluviatile
H. humile
H. tenax
H. varium
var. *humile = Hygroamblystegium humile*
Hygrobiella
H. laxifolia
HYGROBIELLACEAE
Hygrohypnella
H. ochracea
H. polaris
Hygrohypnum
H. alpestre = Platyhypnum alpestre
H. alpinum = Platyhypnum alpinum
H. cochlearifolium = Platyhypnum cochlearifolium
H. duriusculum = Platyhypnum duriusculum
H. eugyrium = Pseudohygrohypnum eugyrium
H. luridum
H. molle = Platyhypnum molle
H. montanum = Campylophyllum montanum
H. norvegicum = Platyhypnum norvegicum
H. ochraceum = Hygrohypnella ochracea
H. polare = Hygrohypnella polaris
H. smithii = Platyhypnum smithii
H. styriacum
H. subeugyrium = Pseudohygrohypnum subeugyrium
HYLOCOMIACEAE
Hylocomiadelphus
H. triquetrus
Hylocomiastrum
H. pyrenaicum
H. umbratum
Hylocomium
H. splendens
Hymenoloma
H. compactum
H. crispulum
H. intermedium = H. mulahaceni
H. mulahaceni
Hymenostylium
H. gracillimum
H. insigne = Hymenostylium recurvirostrum var. *insigne*
H. recurvirostrum
var. ***insigne***
var. ***recurvirostrum***
H. xerophilum
Hyocomium
H. armoricum
Hyophila
H. involuta
HYPNALES
HYPNACEAE
Hypnelloideae
Hypnum
H. aemulans = Stereodon aemulans
H. andoi
H. bambergeri = Campylium bambergeri
H. boreale = Ptychostomum pallescens

H. callichroum = Stereodon callichrous
H. cupressiforme
var. ***cupressiforme***
var. ***filiforme***
var. ***heseleri***
var. ***lacunosum***
var. *resupinatum = Hypnum resupinatum*
var. ***subjulaceum***
H. fertile = Pseudohygrohypnum fertile
H. hamulosum = Stereodon hamulosus
H. holmenii = Stereodon holmenii
H. imponens = Callicladium imponens
H. jutlandicum
H. pallescens = Jochenia pallescens
var. *protuberans = Jochenia protuberans*
H. plicatulum = Aquilonium plicatulum
H. procerrimum = Pseudostereodon procerrimus
H. protuberans = Jochenia protuberans
var. *reptile = Jochenia pallescens*
H. recurvatum = Drepanium fastigiatum
H. reptile = Jochenia pallescens
H. resupinatum
H. revolutum = Roaldia revoluta
var. *dolomiticum = Roaldia dolomitica*
H. sauteri = Microhypnum sauteri
H. subcomplanatum = Hypnum cupressiforme var. subjulaceum
H. subimponens = Stereodon subimponens
H. subjulaceum = Hypnum cupressiforme var. subjulaceum
H. uncinulatum
H. vaucheri = Buckia vaucheri

HYPOPTERYGIACEAE

Hypopterygium
H. tamarisci

Imbribryum
I. alpinum
I. gemmiparum = Bryum gemmiparum
I. mildeanum
I. miniatum
I. muehlenbeckii
I. subapiculatum
I. tenuisetum

Indusiella
I. thianschanica

Isopaches
I. alboviridis
I. bicrenatus
I. decolorans

Isopterygiopsis
I. alpicola
I. muelleriana
I. pulchella

Isopterygium
I. tenerum

Isothecium
I. algarvicum
I. alopecuroides
I. holtii
I. interludens
I. montanum
I. myosuroides
subsp. *brevinerve = Isothecium myosuroides*
var. *brachythecioides = Isothecium interludens*
I. prolixum

Iwatsukiella
I. leucotricha

Jaffueliobryum
J. latifolium

Jamesoniella = Syzygiella
J. autumnalis = Syzygiella autumnalis
J. rubricaulis = Syzygiella rubricaulis
J. undulifolia = Biantheridion undulifolium

Jamesonielloideae

Jochenia
J. pallescens
J. protuberans

JOCHENIACEAE

Jubula
J. hutchinsiae
[subsp. *australiae*]

[subsp. *bogotensis*]
subsp. ***caucasica***
subsp. ***hutchinsiae***
[subsp. *japonica*]
[subsp. *javanica*]
[subsp. *pennsylvanica*]

JUBULACEAE

Jungermannia
J. atrovirens
J. borealis
J. caespiticia = Endogemma caespiticia
J. calcicola
J. callithrix = Solenostoma callithrix
J. confertissima = Solenostoma confertissimum
J. eucordifolia
[*J. exsertifolia*]
subsp. *cordifolia = Jungermannia eucordifolia*
[subsp. *exsertifolia*]
J. gracillima = Solenostoma gracillimum
var. *crenulata = Solenostoma gracillimum*
J. handelii = Solenostoma handelii
J. hyalina = Solenostoma hyalinum
J. jenseniana = Solenostoma sphaerocarpum
J. leiantha = Liochlaena lanceolata
J. lanceolata auct. *= Liochlaena lanceolata*
J. lanceolata = Jungermannia atrovirens
var. *atrovirens = Jungermannia atrovirens*
J. obovata = Solenostoma obovatum
subsp. *minor = Solenostoma subellipticum*
J. paroica = Solenostoma paroicum
J. polaris
J. pumila
var. *alpestris = Jungermannia pumila*
subsp. *polaris = Jungermannia polaris*
J. sphaerocarpa = Solenostoma sphaerocarpum
var. *nana = Solenostoma sphaerocarpum*
J. subelliptica = Solenostoma subellipticum
J. subulata = Liochlaena subulata
var. *leiantha = Liochlaena lanceolata*

JUNGERMANNIACEAE

Jungermannioideae

Kiaeria
K. blyttii
K. falcata
K. glacialis
K. riparia
K. starkei
Kindbergia
K. praelonga
Kurzia
[*K. makinoana*]
K. pauciflora
K. sylvatica
K. trichoclados
Leiocolea = Mesoptychia
L. alpestris = Mesoptychia collaris
L. badensis = Mesoptychia badensis
L. bantriensis = Mesoptychia bantriensis
subsp. *wallfischii = Mesoptychia bantriensis* subsp. *wallfischii*
L. collaris = Mesoptychia collaris
L. fitzgeraldiae = Mesoptychia fitzgeraldiae
L. gillmanii = Mesoptychia gillmanii
L. heterocolpos = Mesoptychia heterocolpos
L. rutheana = Mesoptychia rutheana
var. *laxa = Mesoptychia gillmanii* var. *laxa*
L. turbinata = Mesoptychia turbinata
Lejeunea
L. subgenus *Lejeunea*
L. subgenus *Nanolejeunea*
L. canariensis
[*L. capensis*]
L. cavifolia
[*L. diversifolia = Microlejeunea diversifolia*]
[*L. diversiloba = Microlejeunea diversifolia*]
L. eckloniana
L. flava

[subsp. *flava*]
subsp. ***moorei***
[subsp. *orientalis*]
[subsp. *tabularis*]
[var. *pellucida*]
L. hibernica
L. holtii = *Lejeunea eckloniana*
L. lamacerina
[subsp. *gemminata*]
subsp. ***lamacerina***
[*L. laetevirens*]
L. laetevirens auct. = *Lejeunea canariensis*
L. mandonii
L. patens
L. ulicina = *Microlejeunea ulicina*

LEJEUNEACEAE
Lejeuneeae (trib.)
Lejeuneinae (subtrib.)
Lejeuneoideae
Lembidioideae
LEMBOPHYLLACEAE
Lepidozia
L. azorica = *Telaranea azorica*
L. cupressina
[subsp. *africana*]
subsp. **cupressina**
var. *dissitifolia* = *Lepidozia cupressina* subsp. *cupressina*
[subsp. *natalensis*]
subsp. *pinnata* = *Lepidozia cupressina* subsp. *cupressina*
L. pearsonii
L. reptans
var. *julacea* = *Lepidozia reptans*
var. *tenera* = *Lepidozia reptans*
L. stuhlmannii
[subsp. *stuhlmannii*]
[subsp. *pulvinata*]
[var. *carnosa*]

LEPIDOZIACEAE
Lepidozioideae
Leptobarbula
L. berica
Leptobryum
L. pyriforme
Leptodictyum
L. riparium
Leptodon
L. corsicus
L. longisetus
L. smithii
Leptodontium
L. flexifolium
L. gemmascens
L. proliferum
L. styriacum
Leptophascum = *Chenia*
L. leptophyllum = *Chenia leptophylla*
Leptotheca
L. gaudichaudii
Leptoscyphus
L. subgenus *Anomylia*
L. subgenus *Leptoscyphus*
L. section *Leptoscyphus*
L. azoricus = *L. porphyrius* subsp. *azoricus*
L. cuneifolius
L. porphyrius
subsp. ***azoricus***
[subsp. *porphyrius*]
Leskea
L. polycarpa
Lescuraea
L. incurvata
L. mutabilis
L. patens
L. plicata
L. radicosa
L. saviana
L. saxicola
L. secunda

LESKEACEAE
LEUCOMIACEAE
LEUCOBRYACEAE
Leucobryum
L. albidum
L. glaucum
L. juniperoideum
Leucodon
L. canariensis
L. flagellaris
L. immersus
L. pendulus
L. sciuroides
var. *morensis* = *Leucodon sciuroides*
L. treleasei

LEUCODONTACEAE
Lewinskya
- ***L. acuminata***
- ***L. affinis***
- ***L. breviseta***
- ***L. elegans***
- ***L. fastigiata***
- ***L. iberica***
- ***L. iwatsukii***
- ***L. laevigata***
- ***L. lamyana***
- ***L. pylaisii***
- ***L. rupestris***
- ***L. shawii***
- ***L. sordida***
- ***L. speciosa***
- ***L. striata***
- ***L. tortidontia***
- ***L. transcaucasica***
- ***L. vladikavkana***

Lindbergia
- ***L. dagestanica***
- ***L. grandiretis***
- [*L. brachyptera*]
- *L. brachyptera* auct. eur. = *Lindbergia grandiretis*

Liochlaena
- ***L. lanceolata***
- ***L. subulata***

Loeskeobryum
- ***L. brevirostre***

Loeskypnum
- ***L. badium***

Lophocolea
- ***L. bidentata***
  - var. *rivularis* = *Lophocolea coadunata*
- ***L. bispinosa***
- ***L. brookwoodiana***
- ***L. coadunata***
- *L. cuspidata* = *L. bidentata*
- *L. cuspidata* auct. = *L. coadunata*
- ***L. fragrans***
  - [subsp. *cocosana*]
  - subsp. ***fragrans***
- ***L. heterophylla***
  - [subsp. *cladogyna*]
  - subsp. ***heterophylla***
- [*L. humistrata*]
- ***L. minor***
- ***L. semiteres***
  - [var. *retusa*]
  - var. ***semiteres***

LOPHOCOLEACEAE
Lophozia
- *L. alpestris* auct. = *Barbilophozia sudetica*
- *L. alpestris* = *Mesoptychia collaris* var. *libertae* = *Mesoptychia collaris*
- ***L. ascendens***
- *L. atlantica* = *Orthocaulis atlanticus*
- *L. attenuata* = *Neoorthocaulis attenuatus*
- *L. badensis* = *Mesoptychia badensis*
- *L. bantriensis* = *Mesoptychia bantriensis*
  - var. *subcompressa* = *Mesoptychia bantriensis* subsp. *bantriensis*
- *L. bicrenata* = *Isopaches bicrenatus*
- *L. binsteadii* = *Neoorthocaulis binsteadii*
- *L. capitata* = *Heterogemma capitata*
- *L. cavifolia* = *Orthocaulis cavifolius*
- ***L. ciliata***
- *L. confertifolia* = *Lophozia wenzelii*
- *L. confertifolia* [sensu Schljakov 1975, 1998] = *Lophozia ventricosa*
- *L. confertifolia* [sensu Konstantinova et al. 1992] = *Lophozia murmanica*
- *L. debiliformis* = *Barbilophozia sudetica*
  - var. *concolor* = *Barbilophozia sudetica*
- *L. decolorans* = *Isopaches decolorans*
- *L. elongata* = *Protolophozia elongata*
- *L. excisa* = *Lophoziopsis excisa*
  - var. *cylindracea* = *Lophoziopsis excisa* var. *excisa*
- *L. floerkei* = *Neoorthocaulis floerkei*
- ***L. fuscovirens***
- *L. gillmanii* = *Mesoptychia gillmanii*
  - var. *acutifolia* = *Mesoptychia gillmanii*
- *L. gracillima* = *Lophozia ascendens*

L. grandiretis = Schistochilopsis grandiretis
var. *parviretis = Schistochilopsis grandiretis*
var. *proteidea = Schistochilopsis grandiretis*
L. groenlandica [sensu Grolle & Long 2000, Söderström et al. 2002] = *Lophozia murmanica*
L. groenlandica [sensu Schuster 1969] = *Lophozia schusteriana*
L. groenlandica [sensu Schljakov 1980, 1998] = *Lophozia ventricosa*
L. guttulata
L. hatcheri = Barbilophozia hatcheri
L. herzogiana = Protolophozia herzogiana
L. heterocolpos = Mesoptychia heterocolpos
var. *arctica = Mesoptychia heterocolpos* var. *arctica*
var. *harpanthoides = Mesoptychia heterocolpos* var. *harpanthoides*
L. heteromorpha = Lophozia murmanica
L. hyperarctica = Schistochilopsis hyperarctica
L. incisa = Schistochilopsis incisa
subsp. *opacifolia = Schistochilopsis opacifolia*
L. jurensis = Lophoziopsis jurensis
L. iremelensis = Lophozia wenzelii
L. kunzeana = Schljakovia kunzeana
[*L. lacerata*]
L. lantratoviae
L. latifolia = Lophoziopsis jurensis
L. laxa = Heterogemma laxa
L. longidens = Lophoziopsis longidens
L. longiflora auct. = *Lophozia guttulata*
L. longiflora
var. guttulata = Lophozia guttulata
L. lycopodioides = Barbilophozia lycopodioides
L. murmanica
L. murmanica auct. = L. savicziae
L. obtusa = Obtusifolium obtusum
L. opacifolia = Schistochilopsis opacifolia
L. perssonii = Oleolophozia perssonii
L. pellucida = Lophoziopsis pellucida
L. polaris = Lophoziopsis polaris
L. porphyroleuca = Lophozia guttulata
L. propagulifera auct. eur. = *Lophoziopsis jurensis*
L. quadriloba = Schljakovianthus quadrilobus
var. *glareosa = Schljakovianthus quadrilobus*
L. rubrigemma = Lophoziopsis rubrigemma
L. rutheana = Mesoptychia rutheana
var. *laxa = Mesoptychia rutheana* var. *laxa*
L. savicziae
L. schusteriana
L. silvicola
L. silvicola var. *grandiretis = Lophozia savicziae*
L. silvicoloides
L. sudetica = Barbilophozia sudetica
L. subapiculata
L. ventricosa auct. = *Lophozia silvicola*
L. ventricosa
var. *confusa = Lophozia ventricosa*
var. *grandiretis = Lophozia savicziae*
var. *silvicola = Lophozia silvicola*
var. *uliginosa = Lophozia wenzelii*
var. *uliginosa* auct. [sensu Söderström et al. 2002] = *Lophozia longiflora*
L. wenzelii
var. *groenlandica* [sensu Konstantinova et al. 2009] = *L. murmanica*
var. ***litoralis***
var. ***lapponica***
var. ***massularioides***

var. ***wenzelii***
LOPHOZIACEAE
Lophoziopsis
L. excisa
var. ***elegans***
var. ***excisa***
[var. *infuscata*]
[var. *succulenta*]
L. jurensis
L. latifolia = Lophoziopsis jurensis
L. longidens
subsp. ***arctica***
subsp. ***longidens***
L. pellucida
var. ***minor***
var. ***pellucida***
L. perssonii = Oleolophozia perssonii
L. polaris
var. ***polaris***
var. ***sphagnorum***
[***L. propagulifera***]
L. propagulifera auct. eur. = *Lophoziopsis jurensis*
L. rubescens = Barbilophozia rubescens
L. rubrigemma
f. *arctica = Lophoziopsis longidens* var. *arctica*
[*Luisierella*]
Lunularia
L. cruciata
subsp. ***cruciata***
[subsp. *thaxteri*]
LUNULARIACEAE
Mannia
M. subgenus *Mannia*
M subgenus *Neesiella*
M. androgyna
M. californica
M. controversa
[subsp. *asiatica*]
subsp. ***controversa***
M. fragrans
var. *brevipes = Mannia fragrans* subsp. *fragrans*
subsp. ***fragrans***
[subsp. *orientalis*]
M. gracilis
M. pilosa
M. sibirica
M. triandra
Marchantia
M. subgenus *Chlamidium*
M. subgenus *Marchantia*
M. section *Paleacea*
M. subgenus *Preissia*
M. alpestris = Marchantia polymorpha subsp. *montivagans*
M. aquatica = Marchantia polymorpha subsp. *polymorpha*
[*M. debilis*]
M. latifolia = Marchantia polymorpha subsp. *ruderalis*
M. paleacea
[subsp. *diptera*]
subsp. ***paleacea***
[*M. pappeana*]
M. polymorpha
subsp. ***montivagans***
subsp. ***polymorpha***
subsp. ***ruderalis***
M. quadrata
subsp. ***hyperborea***
subsp. ***quadrata***
M. romanica
MARCHANTIACEAE
Marchantioideae
Marchesinia
M. subgenus *Marchesinia*
M. mackaii
Marsupella
M. adusta = Gymnomitrion adustum
M. alpina = Gymnomitrion alpinum
M. andreaeoides
M. aquatica
M. arctica
M. boeckii
M. brevissima = Gymnomitrion brevissimum
M. commutata = Gymnomitrion commutatum
M. condensata
M. emarginata
subsp. *aquatica = Marsupella aquatica*
var. *pearsonii = Marsupella emarginata*

subsp. *tubulosa = Marsupella tubulosa*
M. funckii
var. *badensis = Marsupella funckii*
M. profunda
M. ramosa = Marsupella funckii
M. sparsifolia
[subsp. *childii*]
subsp. ***sparsifolia***
M. sphacelata
M. spiniloba
M. sprucei
var. *neglecta = Marsupella sprucei*
var. *ustulata = Marsupella sprucei*
M. stableri
M. subemarginata
M. tubulosa
Massularia = Massularia
M. incisa = Schistochilopsis incisa
M. laxa = Heterogemma laxa
Mastigophora
M. woodsii
MASTIGOPHORACEAE
Meesia
M. hexasticha
M. longiseta
M. triquetra
M. uliginosa
MEESIACEAE
Merceyoideae
Mesoptychia
M. badensis
M. bantriensis
subsp. ***bantriensis***
subsp. ***wallfischii***
M. collaris
M. fitzgeraldiae
M. gillmanii
var. gillmanii
var. laxa
M. heterocolpos
var. ***arctica***
var. ***harpanthoides***
var. ***heterocolpos***
M. rutheana
var. laxa = Mesoptychia gillmanii var. laxa
M. sahlbergii
M. turbinata
Mesoptychioideae
Metzgeria
M. conjugata
var. *alipila = Metzgeria conjugata*
var. *macvicari = Metzgeria conjugata*
subsp. *simplex = Metzgeria simplex*
M. consanguinea
M. fruticulosa auct. = *Metzgeria violacea*
M. furcata
var. *expansa = Metzgeria furcata*
var. *flexipilis = Metzgeria furcata*
var. ***furcata***
[var. *pacifica*]
var. *ulvula = Metzgeria furcata*
M. leptoneura
[var. *breviseta*]
var. ***leptoneura***
[var. *polychaeta*]
[*M. procera*]
M. pubescens
M. simplex
M. temperata auct. = *Metzgeria consanguinea*
[*M. temperata*]
M. violacea
METZGERIACEAE
Microbryum
M. curvicollum
M. davallianum
var. ***commutatum***
var. ***conicum***
var. ***davallianum***
M. floerkeanum
M. fosbergii
M. longipes
M. rectum
M. starckeanum
Microcampylopus
M. laevigatus
Microeurhynchium
M. pumilum
Microhypnum
M. sauteri
Microlejeunea
[*M. diversiloba*]
M. ulicina

MICROMITRIACEAE
Micromitrium
M. tenerum
Mielichhoferia
M. elongata
M. mielichhoferiana
Mielichhoferioideae
MNIACEAE
Mnioideae
Mnioloma
M. subgenus *Caracoma*
M. fuscum
Mnium
M. blyttii
M. heterophyllum
M. hornum
M. lycopodioides
M. marginatum
var. ***dioicum***
var. ***marginatum***
M. spinosum
M. spinulosum
M. stellare
M. thomsonii
Moerckia
M. blyttii
M. flotoviana
M. hibernica
MOERCKIACEAE
Molendoa
M. hornschuchiana
M. schliephackei
M. sendtneriana = Molendoa hornschuchianum
M. taeniatifolia
M. tenuinervis = Molendoa hornschuchianum
M. warburgii
Mylia
M. subgenus *Anomalae*
M. subgenus *Mylia*
M. anomala
M. taylorii
MYLIACEAE
Myrinia
M. pulvinata
MYRINIACEAE
Myriocoleopsis
M. minutissima
subsp. ***minutissima***
[subsp. *myriocarpa*]
Myurella
M. julacea
M. sibirica
M. tenerrima
Myurium
M. hochstetteri
MYURIACEAE
Myuroclada
M. longiramea
M. maximowiczii
Nardia
N. breidleri
N. compressa
N. geoscyphus
var. ***bifida***
[var. *dioica*]
var. ***geoscyphus***
var. ***suberecta***
N. insecta
N. japonica
N. pacifica
N. scalaris
[var. *botryoidea*]
[var. *harae*]
var. ***scalaris***
Nardioideae
Neckera
N. baetica = Exsertotheca baetica
N. besseri = Alleniella besseri
N. cephalonica
N. complanata = Alleniella complanata
N. crispa = Exsertotheca crispa
N. intermedia = Exsertotheca intermedia
N. menziesii
N. oligocarpa
N. pennata
N. pumila
NECKERACEAE
Neoorthocaulis
N. attenuatus
N. binsteadii
N. floerkei
N. hyperboreus
Niphotrichum = Racomitrium subgenus *Niphotrichum*
N. canescens = Racomitrium canescens

subsp. *latifolium = Racomitrium canescens* subsp. *latifolium*
N. ericoides = Racomitrium ericoides
N panschii = Racomitrium panschii
Nobregaea
N. latinervis
Nogopterium
N. gracile
Notothylas
N. subgenus *Notothylas*
N. orbicularis (Schwein.) Sull.
NOTATHYLADACEAE
Notathyloideae
Nowellia
Section *Nowellia*
N. curvifolia
Nyholmiella
N. gymnostoma
N. obtusifolia
Obtusifolium
O. obtusum
Ochyraea = Plathypnum
O. tatrensis = Platyhypnum tatrense
Octodiceras = Fissidens subgenus *Octodiceras*
O. fontanum = Fissidens fontanus
Odontoschisma
O. section *Cladopodiella*
O. section *Denudata*
O. section *Neesii*
O. section *Odontoschisma*
O. denudatum
subsp. ***denudatum***
[subsp. *naviculare*]
[subsp. *sandvicense*]
O. elongatum
O. fluitans
O. francisci
O. macounii
O. prostratum = Odontoschisma sphagni
O. sphagni
Odontoschismatoideae
OEDIPODIACEAE
OEDIPODIALES
Oedipodiella
O. australis
Oedipodium
O. griffithianum
Oleolophozia
O. perssonii
Oligotrichum
O. hercynicum
ONCOPHORACEAE
Oncophorus
O. compactus = Oncophorus wahlenbergii
O. demetrii
O. dendrophilus
O. elongatus
O. integerrimus
O. riparius = Kiaeria riparia
O. virens
var. *elongatus = Oncophorus integerrimus*
O. wahlenbergii
var. *compactus = Oncophorus wahlenbergii*
Oreas
O. martiana
Oreoweisia
O. torquescens
Orthocaulis
O. atlanticus
O. attenuatus = Neoorthocaulis attenuatus
O. binsteadii = Neoorthocaulis binsteadii
O. cavifolius
O. floerkei = Neoorthocaulis floerkei
O. hyperboreus = Neoorthocaulis hyperboreus
Orthodicranum = Dicranum
O. fulvum = Dicranum fulvum
O. scottianum = Dicranum scottianum
O. flagellare = Dicranum flagellare
O. montanum = Dicranum montanum
O. tauricum = Dicranum tauricum
ORTHODONTIACEAE
ORTHODONTIALES
Orthodontium
O. gracile
O. lineare
O. pellucens
Orthogrimmia = Grimmia
O. alpestris = Grimmia alpestris
O. arenaria = Grimmia arenaria

O. caespiticia = Grimmia caespiticia
O. donniana = Grimmia donniana
O. montana = Grimmia montana
O. sessitana = Grimmia reflexidens
O. triformis = Grimmia triformis
Ortholimnobium
O. handelii
Orthomnion = Plagiomnium
O. affine = Plagiomnium
O. confertidens = Plagiomnium confertidens
O. curvatulum = Plagiomnium curvatulum
O. cuspidatum = Plagiomnium cuspidatum
O. drummondii = Plagiomnium drummondii
O. elatum = Plagiomnium elatum
O. ellipticum = Plagiomnium ellipticum
O. medium = Plagiomnium medium
O. undulatum = Plagiomnium undulatum
var. *madeirense = Plagiomnium undulatum* var. *madeirensis*
O. rostratum = Plagiomnium rostratum
Orthothecium
O. chryseon
O. intricatum
O. lapponicum
O. rufescens
O. strictum
ORTHOTRICHALES
ORTHOTRICHACEAE
Orthotrichoideae
Orthotrichum
O. acuminatum = Lewinskya acuminata
O. affine = Lewinskya affine
var. *bohemicum = Lewinskya affine*
O. alpestre
O. anomalum
O. bistratosum
O. callistomum
O. cambrense
O. casasianum
O. columbicum
[*O. consimile*]
O. consimile auct. eur. = *Orthotrichum columbicum*
O. comosum
O. consobrinum
O. crenulatum
O. cupulatum
var. *bistratosum = Orthotrichum bistratosum*
var. ***cupulatum***
var. ***fuscum***
var. ***riparium***
O. dagestanicum
O. dentatum
O. diaphanum
O. elegans = Lewinskya elegans
O. gymnostomum = Nyholmiella gymnostoma
O. fastigiatum = Lewinskya fastigiata
O. handiense
O. hispanicum
O. holmenii = Orthotrichum sibiricum
O. ibericum = Lewinskya iberica
O. iwatsukii = Lewinskya iwatsukii
O. laevigatum = Lewinskya laevigata
var. *japonicum = Lewinskya iwatsukii*
O. lyellii = Pulvigera lyellii
O. macounii
subsp. *japonicum = Lewinskya iwatsukii*
O. macrocephalum
O. microcarpum
O. moravicum
O. obtusifolium = Nyholmiella obtusifolia
O. pallens
O. patens
O. pellucidum
O. philibertii
O. pulchellum
O. pumilum
O. pylaisii = Lewinskya pylaisii
O. rivulare
O. rogeri
O. rupestre = Lewinskya rupestris
O. scanicum
O. shevockii

O. schimperi
O. shawii = Lewinskya shawii
O. sibiricum
O. sordidum = Lewinskya sordida
O. speciosum = Lewinskya speciosa
var. *brevisetum = Lewinskya breviseta*
O. sprucei
O. stellatum
O. stramineum
O. striatum = Lewinskya striata
O. tenellum
O. tortidontium = Lewinskya tortidontia
O. urnigerum
O. vladikavkana = Lewinskya vladikavkana
O. vittii

Osculatia
O. apiculata = Anomobryum apiculatum
O. bornholmensis = Ptychostomum bornholmense
O. caespiticia = Ptychostomum imbricatulum
O. demaretiana = Bryum demaretianum
O. barnesii = Bryum dichotomum
O. bicolor = Bryum dichotomum
O. dichotoma = Bryum dichotomum
O. gemmifera = Bryum gemmiferum
O. klinggraeffii = Bryum klinggraeffii
O. kunzei = Ptychostomum kunzei
O. radiculosa = Bryum radiculosum
O. rubens = Ptychostomum rubens
O. ruderalis = Bryum ruderale
O. sauteri = Bryum sauteri
O. subapiculata = Imbribryum subapiculatum
O. tenuiseta = Imbribryum tenuisetum
O. valparaisense = Bryum valparaisense
O. violacea = Bryum violaceum

Oxymitra
O. incrassata

OXYMITRACEAE

Oxyrrhynchium
O. hians
O. pumilum = Microeurhynchium pumilum
O. schleicheri
O. speciosum

Oxystegus = Chionoloma
O. daldinianus = Chionoloma daldinianus
O. hibernicus = Chionoloma hibernicum
O. minor = Chionoloma minus
O. recurvifolius = Chionoloma recurvifolium
O. tenuirostris = Chionoloma tenuirostre
var. *holtii = Chionoloma tenuirostre* var. *holtii*

Palamocladium
P. euchloron
Pallavicinia
P. lyellii
Paludella
P. squarrosa
Palustriella
P. commutata
var. *sulcata = Palustriella falcata*
P. decipiens
P. falcata
P. pluristratosa = Palustriella falcata

Paraleptodontium = Chionoloma
P. recurvifolium = Chionoloma recurvifolium
Paraleucobryum
P. enerve
P. longifolium
var. *sauteri = Paraleucobryum sauteri*
P. sauteri

PALLAVICINIACEAE

Pallavicinioideae
Pedinophyllum
P. interruptum
Pelekium
P. atlanticum
P. minutulum
Pellia
P. endiviifolia = Apopellia endiviifolia
P. epiphylla
subsp. ***borealis***
subsp. ***epiphylla***
P. neesiana

PELLIACEAE
Peltolepis
P. quadrata
PETALOPHYLLACEAE
Petalophyllum
P. ralfsii
Phaeoceros
P. bulbiculosus = Phymatoceros bulbiculosus
P. carolinianus
P. laevis
subsp. *carolinianus = Phaeoceros carolinianus*
Phaeocerotideae
Phascum = Tortula
P. cuspidatum = Tortula acaulon
var. *cuspidatum = Tortula acaulon* var. *acaulon*
var. *papillosum = Tortula acaulon* var. *papillosum*
var. *piliferum = Tortula acaulon* var. *pilifera*
var. *retortifolium = Tortula acaulon* var. *retortifolia*
var. *schreberianum = Tortula acaulon* var. *schreberiana*
P. vlassovii = Tortula vlassovii
Philonotis
P. section *Bartramidula*
P. section *Homomorphae*
P. section *Philonotula*
P. section *Philonotis*
P. arnellii = Philonotis capillaris
P. caespitosa
P. calcarea
P. capillaris
P. cernua
P. falcata
P. fontana
P. hastata
P. marchica
P. rigida
P. seriata
P. tomentella
P. uncinata
P. yezoana
PHYMATOCEROTACEAE
Phymatoceros
P. bulbiculosus
Physcomitrella = Physcomitrium
P. patens = Physcomitrium patens
P. readeri = Physcomitrium readeri
Physcomitridium = Physcomitrium
P. readeri = Physcomitrium readeri
Physcomitrium
P. arenicola
P. eurystomum
subsp. ***acuminatum***
subsp. ***eurystomum***
P. patens
P. pyriforme
P. readeri
P. sphaericum
PILOTRICHACEAE
PLAGIOTHECIACEAE
Plagiobryoides = Ptychostomum
P. cellularis = Ptychostomum cellulare
Plagiobryum = Ptychostomum
P. demissum = Ptychostomum demissum
P. zieri = Ptychostomum zieri
Plagiochasma
P. subgenus *Micropylum*
P. subgenus *Plagiochasma*
P. appendiculatum
[*P. eximium*]
[*P. microcephalum*]
P. rupestre
var. ***rupestre***
[var. *volkii*]
Plagiochila
P. section *Arrectae*
P. section *Fuscoluteae*
P. section *Glauscentes*
P. section *Plagiochila*
P. section *Poeltiae*
P. section *Rutilantes*
P. section *Vagae*
[*P. ambagiosa = Plagiochila spinulosa*]
P. arctica
var. ***arctica***
[?var. *intermedia*]
P. asplenioides
subsp. *arctica = Plagiochila arctica*

var. *devexa* = *Plagiochila porelloides* var. *porelloides*
var. *minor* = *Plagiochila porelloides* var. *porelloides*
var. *humilis* = *Plagiochila porelloides* var. *porelloides*
subsp. *porelloides* = *Plagiochila porelloides*
var. *subarctica* = *Plagiochila porelloides* var. *subarctica*
P. atlantica = *Plagiochila heterophylla* var. *heterophylla*
P. bifaria
var. ***bifaria***
[var. *rosea*]
P. britannica
P. carringtonii
subsp. ***carringtonii***
[subsp. *lobuchensis*]
P. dubia auct. eur. = *P. virginica*
[*P. dubia* = *Plagiochila patula*]
P. exigua
P. heterophylla
[var. *beauverdii*]
var. ***heterophylla***
[*P. javanica*]
P. longispina
P. major = *Plagiochila asplenioides*
P. maderensis
P. norvegica = *Plagiochila porelloides* var. *norvegica*
P. papillifolia
[*P. patula*]
P. porelloides
var. ***norvegica***
var. ***porelloides***
var. ***subarctica***
P. punctata
P. retrorsa
P. spinulosa
P. stricta
[*P. uniformis*]
P. virginica
[var. *caroliniana*]
[var. *euryphylla*]
var. ***virginica***

PLAGIOCHILACEAE

Plagiomnium
P. section *Plagiomnium*
P. section *Rostrata*
P. section *Undulata*
P. affine
P. confertidens
P. curvatulum
P. cuspidatum
P. drummondii
P. elatum
P. ellipticum
P. medium
P. undulatum
var. ***madeirense***
var. ***undulatum***
P. rostratum

Plagiopus
P. oederianus
var. ***alpinus***
var. ***oederianus***

Plagiothecium
P. berggrenianum
P. cavifolium
P. curvifolium
P. denticulatum
var. ***denticulatum***
var. ***obtusifolium***
var. ***undulatum***
P. handelii = *Ortholimnobium handelii*
P. laetum
P. latebricola
P. neckeroideum
P. nemorale
P. noricum = *Plagiothecium neckeroideum*
P. piliferum
P. platyphyllum
P. rossicum
P. succulentum
P. svalbardense
P. undulatum

Plasteurhynchium
P. meridionale
P. striatulum

Platydictya
P. jungermannioides

Platygyrium
- ***P. repens***

Platyhypnidium = Rhynchostegium
- *P. grolleanum = Rhynchostegium riparioides*
- *P. lusitanicum = Rhynchostegium alopecuroides*
- *P. mutatum = Rhynchostegium alopecuroides*
- *P. torrenticola = Rhynchostegium riparioides*

Platyhypnum
- ***P. alpestre***
- ***P. alpinum***
- ***P. cochlearifolium***
- ***P. duriusculum***
- ***P. molle***
- *P. montanum = Campylophyllum montanum*
- ***P. norvegicum***
- ***P. smithii***
- ***P. tatrense***

Plectocolea = Solenostoma
- *P. hyalina = Solenostoma hyalinum*
- *P. obovata = Solenostoma obovatum*
- *P. subelliptica = Solenostoma subellipticum*

Plenogemma
- ***P. phyllantha***

Pleuridium
- ***P. acuminatum***
- *P. palustre = Cleistocarpidium palustre*
- ***P. subulatum***

Pleurochaete = Tortella
- *P. squarrosa = Tortella squarrosa*

Pleurocladula = Fuscocephaloziopsis
- *P. affinis = Fuscocephaloziopsis affinis*
- *P. albescens = Fuscocephaloziopsis albescens*
  - var. *islandica = Fuscocephaloziopsis albescens* var. *islandica*
- *P. catenulata = Fuscocephaloziopsis catenulata*
- *P. connivens = Fuscocephaloziopsis connivens*
- *P. leucantha = Fuscocephaloziopsis leucantha*
- *P. loitlesbergeri = Fuscocephaloziopsis loitlesbergeri*
- *P. lunulifolia = Fuscocephaloziopsis lunulifolia*
- *P. macrostachya = Fuscocephaloziopsis macrostachya*
- *P. pleniceps = Fuscocephaloziopsis pleniceps*

Pleurozia
- *P.* subgenus *Constantifolia* [*P. gigantea*]
- ***P. purpurea***

PLEUROZIACEAE

Pleurozium
- ***P. schreberi***

Pogonatum
- ***P. aloides***
- ***P. dentatum***
- ***P. nanum***
- ***P. neesii***
- ***P. urnigerum***

Pohlia
- ***P. andalusica***
- ***P. andrewsii***
- ***P. annotina***
- ***P. atropurpurea***
- ***P. beringiensis***
- ***P. bolanderi***
- ***P. bulbifera***
- ***P. camptotrachela***
- ***P. cruda***
- ***P. crudoides***
- ***P. drummondii***
- ***P. elongata***
  - var. ***acuminata***
  - var. ***elongata***
  - var. ***greenii***
- ***P. erecta***
- ***P. filum***
- ***P. flexuosa***
  - var. ***flexuosa***
  - var. ***pseudomuyldermansii***
- *P. inclinata = Ptychostomum inclinatum*
- ***P. lescuriana***
- ***P. longicolla***

P. ludwigii
P. lutescens
P. melanodon
P. nutans
subsp. ***nutans***
subsp. ***schimperi***
P. obtusifolia
P. proligera
P. scotica
P. sphagnicola
P. tundrae
P. vexans
P. wahlenbergii
var. ***calcarea***
var. ***glacialis***
var. ***wahlenbergii***
POLYTRICHACEAE
POLYTRICHALES
Polytrichastrum
P. alpinum
var. *fragile* = *Polytrichastrum fragile*
var. *septentrionale* = *Polytrichastrum septentrionale*
P. altaicum
Polytrichastrum formosum = *Polytrichum formosum*
var. *densifolium* = *Polytrichum densifolium*
P. fragile
P. longisetum = *Polytrichum longisetum*
P. norwegicum = *Polytrichastrum alpinum*
P. pallidisetum = *Polytrichum pallidisetum*
P. septentrionale
P. sexangulare
var. *vulcanicum* = *Polytrichastrum sphaerothecium*
P. sphaerothecium
Polytrichum
P. alpestre = *Polytrichum strictum*
P. alpinum = *Polytrichastrum alpinum*
var. *arcticum* = *Polytrichastrum alpinum*
[*P. appressum* = *Polytrichum subpilosum*]
P. commune
var. *commune* = *Polytrichum commune*
var. *humile* = *Polytrichum perigoniale*
var. *perigoniale* = *Polytrichum perigoniale*
var. *swartzii* = *Polytrichum swartzii*
var. *uliginosum* = *Polytrichum commune*
P. densifolium
P. formosum
var. *densifolium* = *Polytrichum densifolium*
P. fragile = *Polytrichastrum fragile*
P. hyperboreum
P. jensenii
P. juniperinum
P. longisetum
P. pallidisetum
P. perigoniale
P. piliferum
P. septentrionale = *Polytrichastrum septentrionale*
P. sexangulare = *Polytrichastrum sexangulare*
P. sphaerothecium = *Polytrichastrum sphaerothecium*
P. strictum
[*P. subpilosum*]
P. swartzii
P. uliginosum = *Polytrichum commune*
Porella
P. arboris-vitae
subsp. ***arboris-vitae***
var. *killarniensis* = *Porella arboris-vitae* subsp. *arboris-vitae*
[subsp. *nitidula*]
var. *obscura* = *Porella arboris-vitae* subsp. *arboris-vitae*
P. baueri
P. canariensis
P. cordaeana
var. *faeroensis* = *Porella cordaeana*

var. *simplicior = Porella cordaeana*
P. inaequalis
[*Porella navicularis*]
P. obtusata
P. pinnata
P. platyphylla
var. *subsquarrosa = Porella platyphylla*
[*P. platyphylloidea*]
PORELLACEAE
Pottia = Tortula
P. commutata = Microbryum davallianum var. *commutatum*
P. conica = Microbryum davallianum var. *Conicum*
P. crinita = Tortula viridifolia
P. intermedia = Tortula caucasica
P. lanceolata = Tortula lindbergii
P. starckeana = Microbryum starckeanum
subsp. *conica = Microbryum davallianum* var. *conicum*
POTTIACEAE
POTTIALES
Pottioideae
Pottiopsis
P. caespitosa
Prasanthus
[*P. jamalicus*]
P. suecicus
Preissia = Marchantia subgenus *Preissia*
P. quadrata = Marchantia quadrata
subsp. *hyperborea = Marchantia quadrata* subsp. *hyperborea*
Protobryum = Tortula
P. bryoides = Tortula protobryoides
Protolophozia
P. elongata
P. herzogiana
Pseudanomodon
P. attenuatus
Pseudephemerum
P. nitidum
Pseudoamblystegium
P. subtile
Pseudobryum
P. cinclidioides
Pseudocalliergon = Drepanocladus
P. angustifolium = Drepanocladus angustifolium
P. brevifolium = Drepanocladus brevifolius
P. lycopodioides = Drepanocladus lycopodioides
P. trifarium = Drepanocladus trifarius
P. turgescens = Drepanocladus turgescens
Pseudocampylium
P. radicale
Pseudocrossidium
P. hornschuchianum
P. obtusulum
P. replicatum
P. revolutum
Pseudohygrohypnum
P. eugyrium
P. fertile
P. subeugyrium
Pseudoleskea = Lescuraea
P. artariae = Pseudoleskeopsis artariae
P. incurvata = Lescuraea incurvata
P. patens = Lescuraea patens
P. radicosa = Lescuraea radicosa
P. saviana = Lescuraea saviana
PSEUDOLESKEACEAE
Pseudoleskeella
P. catenulata
P. nervosa
P. papillosa
P. rupestris
P. tectorum
PSEUDOLESKEELLACEAE
Pseudoleskeopsis
P. artariae
Pseudolophozia = Barbilophozia subgenus *Sudeticae*
P. debiliformis = Barbilophozia sudetica
P. sudetica = Barbilophozia sudetica
Pseudomalia
P. webbiana
Pseudorhynchostegiella
P. duriaei
Pseudoscleropodium

P. purum
Pseudostereodon
P. procerrimus
[*Pseudosymblepharis*]
P. bombayensis = Chionoloma bombayense
Pseudotaxiphyllum
P. elegans
P. laetevirens
Pseudotritomaria
P. heterophylla
Psilopilum
P. cavifolium
P. laevigatum
PTERIGYNANDRACEAE
Pterigynandrum
P. filiforme
var. *majus = Pterigynandrum*
Pterogonium = Nogopterium
P. gracile = Nogopterium gracile
Pterygoneurum
P. compactum = Pterygoneurum ovatum
P. crossidioides = Pterygoneurum ovatum
P. kozlovii
P. lamellatum
P. ovatum
P. papillosum
P. sampaianum
P. squamosum = Pterygoneurum ovatum
P. subsessile
PTILIDIACEAE
Ptilidium
P. ciliare
P. pulcherrimum
var. *subpinnatum = Ptilidium pulcherrimum*
Ptilium
P. crista-castrensis
Ptychanthoideae
Ptychodium = Lescuraea
P. plicatum = Lescuraea plicata
PTYCHOMITRIACEAE
Ptychomitrium
P. incurvum
P. nigrescens
P. polyphyllum
Ptychostomum
P. archangelicum = Ptychostomum inclinatum
P. arcticum
P. austriacum
P. boreale = Ptychostomum pallescens
P. bornholmense
P. calophyllum
P. capillare
P. cellulare
P. cernuum
P. compactum
var. ***compactum***
var. ***rutheanum***
P. creberrimum
P. cryophilum
P. cyclophyllum
P. demissum
P. donianum
P. elegans
P. funkii
P. imbricatulum
P. inclinatum
P. intermedium
P. knowltonii
P. kunzei
P. longisetum
P. minii
P. moravicum
P. neodamense = Ptychostomum pseudotriquetrum
P. pallens
P. pallescens
P. pseudotriquetrum
var. ***bimum***
var. ***pseudotriquetrum***
P. rubens
P. salinum
P. schleicheri
var. ***latifolium***
var. ***schleicheri***
P. torquescens
P. turbinatum
P. warneum
P. weigelii
P. wrightii
P. zieri
Pulvigera
P. lyellii
Pylaisia

P. polyantha
P. selwynii
PYLAISIACEAE
PYLAISIADELPHACEAE
Pyramidula
P. tetragona
Pyramiduloideae
Racomitrioideae
Racomitrium
R. subgenus *Cataracta*
R. subgenus *Ellipticodryptodon*
R. subgenus *Racomitrium*
R. subgenus *Niphotrichum*
R. affine
R. aciculare
R. aquaticum
R. canescens
subsp. ***canescens***
subsp. ***latifolium***
R. ellipticum
R. elongatum
R. ericoides
R. fasciculare
R. hespericum
R. heterostichum
R. himalayanum
R. lamprocarpum
R. lanuginosum
R. lusitanicum
R. macounii
subsp. ***alpinum***
subsp. ***macounii***
R. microcarpon
R. nivale
R. obtusum
R. panschii
R. sudeticum
Radula
R. subgenus *Radula*
R. subgenus *Volutoradula*
R. aquilegia
R. carringtonii
R. complanata
var. *alpestris* = *Radula complanata*
subsp. *lindenbergiana* = *Radula lindenbergiana*
R. holtii
R. jonesii
R. lindbergiana = *Radula lindenbergiana*
R. lindenbergiana
R. nudicaulis
var. ***delicatula***
var. ***nudicaulis***
[*R. prolifera*]
R. voluta
R. visianica
R. wichurae
RADULACEAE
Reboulia
R. hemisphaerica
[subsp. *acrogyna*]
subsp. ***australis***
subsp. ***dioica***
[var. *fissisquama*]
subsp. ***hemisphaerica***
[subsp. *orientalis*]
[subsp. *paradoxa*]
[var. *turkestanica*]
Rhabdoweisia
R. crenulata
R. crispata
R. fugax
RHABDOWEISIACEAE = ONCOPHORACEAE
Rhamphidium
R. purpuratum
RHIZOGONIACEAE
RHIZOGONIALES
Rhizomnium
R. andrewsianum
R. gracile
R. magnifolium
R. pseudopunctatum
R. punctatum
var. ***hermanperssonii***
var. ***punctatum***
Rhynchostegiella
R. azorica
R. bourgaeana
R. curviseta
R. durieui = *Pseudorhynchostegiella durieui*
R. jacquinii = *Rhynchostegiella teneriffae*
R. litorea
R. macilenta = *Rhynchostegiella teneriffae*
R. pseudolitorea

R. tenella
var. *meridionalis* = *Rhynchostegiella litorea*
R. teesdalei = *Rhynchostegiella teneriffae*
R. teneriffae
R. tenuicaulis = *Brachythecium tenuicaule*
R. trichophylla
R. tubulosa
Rhynchostegium
R. alopecuroides
R. arcticum = *Rhynchostegium murale*
R. confertum
R. confusum
R. megapolitanum
R. murale
R. riparioides
R. rotundifolium
R. strongylense
Rhytidiadelphus
R. loreus
R. squarrosus
R. subpinnatus
R. triquetrus = *Hylocomiadelphus triquetrus*
Rhytidiaceae
Rhytidium
R. rugosum
Rhodobryum
R. ontariense
R. roseum
Riccardia
R. chamedryfolia
var. *major* = *Riccardia chamedryfolia*
var. *submersa* = *Riccardia chamedryfolia*
R. incurvata
R. latifrons
subsp. ***arctica***
subsp. ***latifrons***
[var. *miyakeana*]
R. multifida
[subsp. *decrescens*]
subsp. ***multifida***
[subsp. *synoica*]
R. palmata
Riccia
R. section *Pilifer*
*R.*subgenus *Riccia*
R. *section Riccia*
R. subgenus *Ricciella*
R. section *Ricciella*
R. section *Spongodes* Nees
R. atlantica
R. atromarginata
var. ***atromarginata***
[var. *jovet-astiae*]
R. beyrichiana
R. bicarinata
R. bifurca
var. *subinermis* = *Riccia bifurca*
R. boumanii
R. breidleri
[*R. bullosa*]
[*R. capensis* = *Riccia concava*]
[*R. chudoana*]
[*R. concava*]
[*R. congoana*]
R. cavernosa
var. *angustior* = *Riccia cavernosa*
R. crystallina
R. canaliculata
R. canescens = *Riccia ciliata*
R. ciliata
var. *epilosa* = *Riccia ciliata*
var. *intumescens* = *Riccia ciliata*
var. *violacea* = *Riccia ciliata*
R. ciliifera
[*R. crinita*]
R. crozalsii
R. crustata
R. dalslandica = *Riccia ciliata*
R. duplex
var. ***duplex***
[var. *megaspora*]
R. fluitans
R. frostii
[var. *crystallinoides*]
var. ***frostii***
R. glauca
var. ***ciliaris***
var. ***glauca***
var. *major* = *Riccia glauca*
var. *subinermis* = *Riccia glauca*
var. *ciliaris*
R. gothica

R. gougetiana
var. ***armatissima***
var. ***gougetiana***
R. huebeneriana
subsp. ***huebeneriana***
var. *pseudo-frostii = Riccia huebeneriana* subsp. *huebeneriana*
[subsp. *sullivantii*]
R. intumescens = Riccia ciliata
R. lamellosa
R. ligula
[*R. limbata*]
R. lindenbergiana = Riccia sorocarpa subsp. *arctica*
R. macrocarpa
[*R. mamillata*]
R. marginata = Riccia beyrichiana
R. melitensis = Riccia ciliifera
R. michelii
R. nigrella
[*R. oerstediana*]
R. papillosa
R. perennis
[*R. polycarpa*]
R. rhenana
var. ***huebeneriana***
var. ***violacea***
R. sommieri
R. sorocarpa
subsp. ***arctica***
subsp. ***erythrophora***
subsp. ***sorocarpa***
var. *heegii = Riccia sorocarpa*
var. ***sorocarpa***
R. subbifurca
R. teneriffae = Riccia cavernosa
R. trabutiana
R. trichocarpa = Riccia ciliata
R. warnstorfii
var. ***ciliaris***
var. *commutata = Riccia warnstorfii*
var. *subinermis = Riccia warnstorfii* var. *ciliaris*
var. ***warnstorfii***

RICCIACEAE

Ricciocarpos
R. natans

Riella
R. subgenus *Riella*
R. subgenus *Trabutiella*
R. affinis
R. battandieri
R. bialata
R. cossoniana
[*R. cyrenaica*]
R. echinata
R. gallica
R. helicophylla
var. ***helicophylla***
var. ***macrocarpa***
R. mediterranea
R. notarisii
[*R. numidica*]
[*R. parisii*]
R. reuteri
[*R. sersuensis*]

RIELLACEAE

Roaldia
R. dolomitica
R. revoluta

Rosulabryum = Ptychostomum
R. bornholmense = Ptychostomum bornholmense
R. canariense = Ptychostomum canariense
R. capillare = Ptychostomum capillare
R. donianum = Ptychostomum donianum
R. elegans = Ptychostomum elegans
R. laevifilum = Ptychostomum moravicum
R. rubens = Ptychostomum rubens
R. torquescens = Ptychostomum torquescens

Saccobasis
S. polita
S. polymorpha

Saccogyna
S. viticulosa

SACCOGYNACEAE

Saelania
S. glaucescens

SAELANIACEAE

Sanionia
S. nivalis

[*S. georgicouncinata* (Müll.Hal.) Ochyra & Hedenäs]
S. georgicouncinata auct. eur. = *Sanionia nivalis*
S. orthothecioides
S. uncinata
Sarmentypnum
S. exannulatum
S. procerum
S. sarmentosum
S. trichophyllum
S. tundrae
Sauteria
S. section *Sauteria*
S. alpina
Scapania
S. subgenus *Gracilidae*
S. subgenus *Plicaticalyx*
S. subgenus *Scapania*
S. section *Aequilobae*
S. section *Apiculatae*
S. section *Compactae*
S. section *Curtae*
S. section *Cuspiduligerae*
S. section *Hyperboreae*
S. section *Kaalaasia*
S. section *Nemorosae*
S. section *Planifoliae*
S. section *Scapania*
S. section *Scapaniella*
S. section *Simmonsiae*
S. section *Sphaeriferae*
S. section *Verrucosae*
S. aequiloba
S. aspera
S. apiculata
S. brevicaulis auct. eur. = Scapania degenii
[*S. brevicaulis*]
var. *dubia = Scapania degenii*
S. calcicola
S. carinthiaca
var. ***carinthiaca***
var. ***massalongi***
S. compacta
S. crassiretis
S. curta
var. ***curta***
var. ***grandiretis***
var. ***isoloba***
S. cuspiduligera
var. ***cuspiduligera***
[var. *diplophyllopsis*]
S. degenii
var. *dubia = Scapania degenii*
S. glaucocephala
var. ***glaucocephala***
[var. *saxicola*]
var. *scapanoides = Scapania scapanioides*
S. gracilis
S. gymnostomophila
S. helvetica
S. hyperborea
S. irrigua
subsp. ***irrigua***
var. *rubescens = Scapania irrigua* subsp. *irrigua*
subsp. ***rufescens***
S. kaurinii
S. ligulifolia
S. lingulata
var. ***lingulata***
var. ***microphylla***
[*S. microdonta*]
S. mucronata
var. *praetervisa = Scapania praetervisa*
S. nemorea
S. nimbosa
S. obcordata
S. obscura
S. ornithopodioides
S. parvifolia
S. paludicola
var. ***paludicola***
var. ***rotundiloba***
var. *rufescens = Scapania paludicola*
[var. *viridigemma*]
S. paludosa
var. *isoloba = Scapania paludosa*
var. *rubiginosa = Scapania paludosa*
var. *vogesiaca = Scapania paludosa*
S. paradoxa = Scapania obcordata
S. praetervisa
S. scandica
var. ***argutedentata***

[var. *dimorpha*]
var. ***grandiretis***
var. ***scandica***
S. scapanioides
S. simmonsii
S. sphaerifera
S. spitsbergensis
S. subalpina
[var. *haynesiae*]
[var. *muddiae*]
var. ***subalpina***
S. tundrae
S. uliginosa
S. umbrosa
S. undulata
var. *aequatiformis* = *Scapania undulata*
var. *dentata* = *Scapania undulata*
var. *oakesii* = *Scapania undulata*
S. verrucosa
S. zemliae

SCAPANIACEAE

Schistidium
S. abrupticostatum
S. agassizii
S. andreaeopsis
S. apocarpum
S. atrichum
S. atrofuscum
S. boreale
S. brunnescens
subsp. ***brunnescens***
subsp. ***griseum***
S. bryhnii
S. canadense
S. confertum
S. confusum
S. convergens
S. crassipilum
S. crenatum
S. dupretii
S. echinatum
S. elegantulum
subsp. ***elegantulum***
subsp. ***wilsonii***
S. flaccidum
S. flexipile
S. frigidum
var. ***frigidum***
var. ***havaasii***
S. frisvollianum
S. grande
S. grandirete
S. helveticum
S. holmenianum
S. lancifolium
S. marginale
S. maritimum
subsp. ***maritimum***
subsp. ***piliferum***
S. obscurum
S. occidentale
S. papillosum
S. platyphyllum
var. *abrupticostatum* = *Schistidium abrupticostatum*
S. poeltii
S. pruinosum
S. pulchrum
S. recurvum
S. rivulare
S. robustum
S. scandicum
S. sibiricum
S. sinensiapocarpum
S. singarense = *Schistidium helveticum*
S. sordidum
S. spinosum
S. strictum
S. subconfertum
S. subflaccidum
S. subjulaceum
S. submuticum
subsp. ***arcticum***
subsp. ***submuticum***
S. succulentum
S. tenerum
S. tenuinerve
S. trichodon
var. ***nutans***
var. ***trichodon***
S. umbrosum
S. venetum

Schistochilopsis
S. grandiretis
S. elegans = *Lophoziopsis excisa* var. *elegans*
S. hyperarctica

S. incisa
var. *inermis* = *Schistochilopsis incisa*
S. opacifolia
Schistostega
S. pennata
SCHISTOSTEGACEAE
Schizophyllopsis
S. sphenoloboides
Schizymenium
S. pontevedrense
Schljakovia
S. kunzeana
Schljakovianthus
S. quadrilobus
Sciuro-hypnum
S. curtum
S. dovrense
S. flotowianum
S. glaciale
S. latifolium
S. oedipodium
S. ornellanum
S. plumosum
S. populeum
S. reflexum
S. starkei
S. tromsoeense
Scleropodium
S. cespitans
S. touretii
Scopelophila
S. cataractae
S. ligulata
SCORPIDIACEAE
Scorpidium
S. cossonii
S. revolvens
S. scorpioides
Scorpiurium
S. circinatum
S. deflexifolium
S. sendtneri
Seligeria
S. subgenus *Blindiadelphus* = *Blindiadelphus*
S. subgenus *Megalosporia*
S. subgenus *Seligeria*
S. austriaca
S. acutifolia
S. alpestris = *Seligeria patula*
S. brevifolia
S. calcarea
S. calycina
S. campylopoda = *Blindiadelphus campylopodus*
S. carniolica
S. diversifolia = *Blindiadelphus diversifolius*
S. donniana
S. galinae = *Seligeria donniana*
S. irrigata
S. oelandica
S. patula
var. *alpestris* = *Seligeria patula*
S. polaris = *Blindiadelphus polaris*
[*S. paucifolia*]
S. paucifolia auct. eur. = *Seligeria calycina*
S. pusilla
S. recurvata = *Blindiadelphus recurvatus*
S. subimmersa = *Blindiadelphus subimmersus*
S. transylvanica = *Brachydontium trichodes*
S. trifaria
var. ***longifolia***
var. ***trifaria***
S. tristichoides
var. *patula* = *Seligeria patula*
SELIGERIACEAE
SEMATOPHYLLACEAE
Sematophyllum
S. adnatum
S. demissum
S. substrumulosum
Serpoleskea
S. confervoides
Solenostoma
S. subgenus *Eucalyx*
S. subgenus *Metasolenostoma*
S. subgenus *Plectocolea*
S. subgenus *Solenostoma*
S. callithrix
S. caucasicum
S. confertissimum
S. gracillimum
S. handelii
S. hyalinum
[*S. lignicola*]

S. obovatum
S. paroicum
S. pusillum = *S. sphaerocarpum*
S. sphaerocarpum
var. *nanum* = *Solenostoma sphaerocarpum*
S. subellipticum
[*S. subtilissimum*]
SOLENOSTOMATACEAE
Southbya
S. nigrella
S. tophacea
SOUTHBYACEAE
SPHAEROCARPACEAE
Sphaerocarpos
S. subgenus *Austrosphaerocarpos*
S. subgenus *Sphaerocarpos*
S. europaeus
S. michelii
S. stipitatus
S. texanus auct. = *S. europaeus*
[*S. texanus*]
SPHAGNACEAE
SPHAGNALES
Sphagnum
S. section *Acutifolia*
S. section *Cuspidata*
S. section *Insulosa*
S. section *Polyclada*
S. section *Squarrosa*
S. section *Subsecunda*
S. subgenus *Acutifolia*
S. subgenus *Rigida*
S. subgenus *Sphagnum*
S. affine
var. *flagellare* = *Sphagnum affine*
S. angermanicum
S. angustifolium
S. annulatum
S. aongstroemii
S. arcticum
S. auriculatum
S. austinii
S. balticum
S. beothuk
S. brevifolium = *Sphagnum fallax* var. *brevifolium*
S. capillifolium
subsp. *capillifolium* = *Sphagnum capillifolium*
subsp. *rubellum* = *Sphagnum rubellum*
S. centrale
S. compactum
S. concinnum
S. contortum
S. cuspidatum
var. ***cuspidatum***
var. ***viride***
S. denticulatum = *Sphagnum auriculatum*
S. divinum
S. fallax
subsp. *isoviitae* = *Sphagnum fallax* var. *isoviitae*
var. ***brevifolium***
var. ***fallax***
var. ***isoviitae***
S. fimbriatum
subsp. *concinnum* = *Sphagnum concinnum*
S. flexuosum
S. fuscum
S. girgensohnii
[*S. imbricatum*]
subsp. *affine* = *Sphagnum affine*
subsp. *austinii* = *Sphagnum austinii*
S. inundatum
S. isoviitae = *Sphagnum fallax* var. *isoviitae*
S. jensenii
S. lenense
S. lindbergii
[*S. magellanicum* Brid.]
S. magellanicum auct. eur. p.p. = *Sphagnum divinum*
S. magellanicum auct. eur. p.p. = *Sphagnum medium*
S. majus
subsp. ***majus***
subsp. ***norvegicum***
S. medium
S. mirum
S. molle
S. nitidulum
S. obtusum
S. olafii
S. palustre

var. *centrale = Sphagnum centrale*
S. papillosum
S. platyphyllum
S. pulchrum
S. pylaesii
S. quinquefarium
S. recurvum
S. riparium
S. rubellum
S. rubiginosum
S. russowii
S. skyense
S. squarrosum
S. strictum
S. subfulvum
subsp. ***purpureum***
subsp. ***subfulvum***
S. subnitens
subsp***. ferrugineum***
subsp***. subnitens***
var. *ferrugineum = Sphagnum subnitens subsp. ferrugineum*
S. subsecundum
S. tenellum
S. teres
S. tescorum
S. troendelagicum
S. tundrae
S. venustum
S. viride = Sphagnum cuspidatum var. *viride*
S. warnstorfii
S. wulfianum
Sphenolobopsis
S. pearsonii
Sphenolobus
S. cavifolius = Orthocaulis cavifolius
S. minutus
S. saxicola
SPLACHNACEAE
SPLACHNALES
Splachnobryum
S. obtusum
Splachnoideae
Splachnum
S. ampullaceum
S. luteum
S. melanocaulon
S. pensylvanicum
S. rubrum
S. sphaericum
S. vasculosum
Stegonia
S. latifolia
var. ***latifolia***
var. ***pilifera***
Stereodon
S. aemulans
S. callichrous
S. fertilis = Pseudohygrohypnum fertile
S. hamulosus
S. holmenii
S. pratensis
S. subimponens
STEREODONTACEAE
Straminergon
S. stramineum
Streblotrichoideae
Streblotrichum
S. convolutum
var. ***commutatum***
var. ***convolutum***
S. commutatum = Streblotrichum convolutum var. *commutatum*
S. enderesii
Streptocolea = Grimmia
S. atrata = Grimmia atrata
Syntrichia
S. amplexa = Tortula amplexa
S. bogotensis
S. calcicola
S. caninervis
var. ***abranchesii***
var. ***astrakhanica***
var. ***caninervis***
var. ***gypsophila***
S. densa = Syntrichia ruralis
S. echinata
S. fragilis
S. glabra = Syntrichia ruralis
S. handelii
S. laevipila
S. pagorum = Syntrichia laevipila
S. latifolia
S. minor
S. montana

var. ***calva***
var. ***montana***
S. norvegica
S. papillosa
S. papillosissima
S. princeps
S. rigescens
S. ruraliformis
S. ruralis
var. ***epilosa***
var. *ruraliformis* = *S. ruraliformis*
var. ***ruralis***
S. sinensis
S. submontana
S. subpapillosissima
S. virescens
Syzygiella
S. subgenus *Syzygiella*
S. autumnalis
[*S. manca*]
S. rubricaulis
Targionia
T. subgenus *Targionia*
T. hypophylla
subsp. ***hypophylla***
[subsp. *linealis*]
T. lorbeeriana
TARGIONIACEAE
TAXIPHYLLACEAE
Taxiphyllum
T. densifolium
T. wissgrillii
Tayloria
T. acuminata
T. froelichiana
T. hornschuchii
T. lingulata
T. rudolphiana
T. serrata
T. splachnoides
T. tenuis
Taylorioideae
Telaranea
T. azorica
T. europaea
T. longii = *Tricholepidozia tetradactyla*
T. murphyae = *Tricholepidozia tetradactyla*
T. nematodes auct. eur. = *Telaranea europaea*
[*T. nematodes*]
T. sejuncta auct. eur. = *Telaranea europaea*
[*T. sejuncta*]
Tetralophozia
T. filiformis
T. setiformis
TETRAPHIDACEAE
TETRAPHIDALES
Tetraphis
T. pellucida
Tetraplodon
T. angustatus
T. blyttii
T. mnioides
T. pallidus
T. paradoxus
T. urceolatus
Tetrastichium
T. fontanum
T. virens
Tetrodontium
T. brownianum
T. ovatum
T. repandum
Thamnobryum
T. alopecurum
T. angustifolium
T. cataractarum
T. fernandesii
T. maderense
T. neckeroides
T. rudolphianum
T. subserratum
Thuidiopsis
T. sparsa
THUIDIACEAE
Thuidium
T. assimile
T. delicatulum
T. recognitum
T. tamariscinum
Timmia
T. section *Norvegica*
T. section *Timmia*
T. section *Timmiaurea*
T. austriaca
T. bavarica

T. megapolitana
T. comata
T. norvegica
T. sibirica
TIMMIACEAE
TIMMIALES
Timmiella
T. anomala
T. barbuloides
T. flexiseta
TIMMIELLACEAE
Tomentypnum
T. nitens
Tortella
T. alpicola
[*T. arctica*]
T. arctica auct. = *Tortella x cuspidatissima*
T. bambergeri = *Tortella tortuosa*
T. bambergeri auct. p.p. = *Tortella fasciculata*
T. bambergeri auct. p.p. = *Tortella pseudofragilis*
T.* x *cuspidatissima
T. densa
T. fasciculata
T. flavovirens
var. ***flavovirens***
var. ***glareicola***
var. ***papillosissima***
T. fragilis
var. *moravica* = *Tortella pseudofragilis*
T. humilis
T. inclinata
var. *densa* = *Tortella densa*
T. inflexa
T. limbata
T. limosella = *Tortella flavovirens*
T. mediterranea
T. nitida
T. pseudofragilis
T. rigens
T. spitsbergensis
T. squarrosa
T. tortuosa
subsp. *fasciculata* = *Tortella fasciculata*
Tortula
T. acaulon
var. ***acaulon***
var. ***papillosa***
var. ***pilifera***
var. ***retortifolia***
var. ***schreberiana***
T. amplexa
T. ampliretis
T. atrovirens
T. bogosica
T. bolanderi
T. brevissima
T. canescens
T. caucasica
T. cernua
T. cuneifolia
T. freibergii
T. guepinii
T. hoppeana
T. inermis
T. israelis
T. lanceola = *Tortula lindbergii*
T. laureri
T. leucostoma
T. lindbergii
T. lingulata
T. marginata
T. modica = *Tortula caucasica*
T. mucronifolia
T. muralis
subsp. ***muralis***
subsp. ***obtusifolia***
var. ***aestiva***
var. ***muralis***
T. obtusifolia = *Tortula muralis* subsp. *obtusifolia*
T. pallida
T. protobryoides
T. rhodonia = *Henediella heimii*
T. randii
T. revolvens
T. schimperi
T. solmsii
T. subulata
var. *graefii* = *Tortula subulata*
var. *subinermis* = *Tortula subulata*
T. systylia
T. truncata
T. ucrainica
T. vahliana
T. viridifolia

T. vlassovii
T. wilsonii
Trachycystis
T. ussuriensis
Trematodon
T. ambiguus
T. brevicollis
T. laetevirens
T. longicollis
T. perssoniorum
Trichocolea
T. tomentella
TRICHOCOLEACEAE
Trichodon
T. cylindricus
Tricholepidozia
T. lindenbergii
[var. *complanata*]
var. ***lindenbergii***
[var. *mellea*]
[var. *papillata*]
T. tetradactyla
Trichostomoideae
Trichostomopsis = Didymodon
T. umbrosa = Didymodon umbrosus
Trichostomum
T. arcticum = Tortella spitsbergensis
T. brachydontium
T. crispulum
T. hibernicum = Chionoloma hibernicum
T. recurvifolium = Chionoloma recurvifolium
T. triumphans = Pottiopsis triumphans
Trilophozia
T. quinquedentata
[var. *assymetrica*]
var. ***quinquedentata***
Triquetrella
T. arapilensis
Tritomaria
T. exsecta
subsp. ***exsecta***
[subsp. *novaezelandia*]
T. exsectiformis
subsp. ***arctica***
[subsp. *camerunensis*]
subsp. ***exsectiformis***
T. polita = Saccobasis polita
subsp. *polymorpha = Saccobasis polymorpha*
T. quinquedentata = Trilophozia quinquedentata
var. *dentata = Trilophozia dentata*
f. *gracilis = Trilophozia quinquedentata*
var. *grandiretis = Trilophozia quinquedentata*
subsp. *turgida = Trilophozia quinquedentata*
T. scitula
Trochobryum = Seligeria
T. carniolicum = Seligeria carniolica
Tylimanthus = Acrobolbus
[*T. anisodontus = Acrobolbus anisodontus*]
T. azoricus = Acrobolbus azoricus
T. madeirensis = Acrobolbus madeirensis
Ulota
U. bruchii
U. calvescens
U. coarctata
U. crispa
var. *crispula = Ulota crispula*
var. *intermedia = Ulota intermedia*
U. crispula
U. curvifolia
U. drummondii
U. hutchinsiae
U. intermedia
U. macrospora
U. phyllantha = Phenogemma phyllantha
U. rehmannii
Vesicularia
V. reimersiana
Vinealobryum = Didymodon
V. brachyphyllum = Didymodon brachyphyllus
V. cordatum = Didymodon cordatus
V. eckeliae = Didymodon eckeliae
V. insulanum = Didymodon insulanus
V. luridum = V. luridus
V. nicholsonii = Didymodon nicholsonii
Voitia
V. hyperborea

V. nivalis
Warnstorfia
W. exannulata = *Sarmentypnum exannulatum*
W. fluitans
W. procera = *Sarmentypnum procerum*
W. pseudostraminea
W. sarmentosa = *Sarmentypnum sarmentosum*
W. trichophylla = *Sarmentypnum trichophyllum*
W. tundrae = *Sarmentypnum tundrae*
Weissia
W. angustifolia
W. brachycarpa
W. condensa
var. ***armata***
var. ***condensa***
W. controversa
var. ***controversa***
var. ***crispata***
var. ***densifolia***
W. levieri
W. longifolia
var. *angustifolia* = *Weissia angustifolia*
W.* x *mittenii
W. multicapsularis = *Tortula acaulon*
W. multicapsularis auct. = *Weissia wilsonii*
W. perssonii
W. rostellata
W. rutilans
W. squarrosa
W. sterilis
Weissia triumphans = *Pottiopsis triumphans*
W. wilsonii
W. wimmeriana
Zoopsidoideae
Zygodon
Z. bistratus = *Zygodon catarinoi*
Z. catarinoi
Z. conoideus
var. ***conoideus***
var. ***lingulatus***
Z. dentatus
Zygodon forsteri = *Codonoblepharon forsteri*
Z. gracilis
Z. rupestris
Z. sibiricus
Z. stirtonii
Z. viridissimus

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